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From Lewis's Observations on Experimental Farming.

ON THE PURIFICATION AND CLASSIFICATION OF SEEDS, ROOTS, &c.

It has been already stated that farmers are extremely cautious, and even backward, in the adoption of anything *new*. Potatoes, for instance, although brought into England about the end of the 16th century, were long confined to the gardens of the nobility and gentry; and in Scotland were not planted in the open fields until the year 1792, upwards of 200 years after their first introduction. So prejudiced, indeed, were the Scottish peasantry against their admission, that they attributed the origin of every disease, no matter of what nature, to the influence of this vegetable. Turnips, also, although known in Britain before the potato, did not come into general cultivation until long after the days of Tull, a Berkshire agriculturist, who introduced the system of drill husbandry in the year 1701. He obtained very few followers for more than 30 years, and Scotland was the first to reduce his system to practice. In 1760 it was there in pretty general adoption. Hence it was introduced into Northumberland in 1780; and it has since slowly found its way into the more southern parts of the island. Such has been the introduction of two of the most valuable roots that are now in cultivation; and assuredly we could not have well adduced a stronger practical illustration of the probable usefulness of an experimental farm for promulgating a knowledge, and expediting the culture of those vegetables whose qualities and merits have been previously untested, or partially ascertained.

The introduction of potatoes and turnips, it may be said, took place when education was at a very low ebb, and when the supineness of our agriculturists was at its height, and therefore, that any deductions drawn from this subject are inapplicable now. But we shall shortly make it more than probable that, even with all the science and enterprise of modern times, there is yet a wide field of discovery lying before us, and which hitherto has been almost wholly neglected.

We allude more particularly to the classification and purification of seeds. Individuals no doubt have at different times, directed their attention to this subject, but their labors, instead of remedying the existing defects, have only tended to show the almost unlimited extent to which improvement in this department might be carried. They have failed, not from the unfruitfulness of the subject, but from the inadequacy of individual exertion for the task, and their failure is a powerful practical argument in favor of a combined and collected effort for the full developement of the latent and hitherto dormant susceptibilities of the vegetable kingdom.

The grand distinguishing characteristic of plants over inorganic matter—that which characterises their latent powers and living functions—is their susceptibility of improvement; animals have it to a certain degree, but not nearly to such an extent as plants, for the productive faculty of the former cannot be increased like that of the latter. As is well remarked by Mr. Sharon Turner, most agreeable and surprising transformations have arisen from this property. The rose is the product of cultivation; the original plant from which all our beautiful varieties have proceeded is considered by botanists to be the common wild brier. Our plums are cultivated descendants of the sloe; the peach and nectarines, of the common almond tree; filberts are the improvements of the wild hazel; the delicious apples, whose species may now be reckoned by hundreds, are cultivated successors of the small austere crabs and wildings which swine will scarcely eat; the original pear is a petty fruit as hard and crude as the former; our cauliflowers, cabbages, and other domestic vegetables, may be regarded as almost artificial products, so much has human skill had to do in their production.

If, then, so great a susceptibility of improvement exists in the productions of horticulture, it becomes a question of great interest, and momentous importance to ascertain whether or not the different species of grain, roots, and grasses, employed in agriculture are possessed of a like inherent susceptibility. It is a well known fact, that grain, if allowed to degenerate, returns into a state very similar to that of some of our coarser grasses, which of itself is a very strong argument for the point at issue. But we have still more unequivocal evidence that, even in what may be denominated its present improved state when compared with the inferiorty of its supposed original, it is possessed of the principle of productiveness to an extent fully as great as the vegetables mentioned in the above quotation. To prove this we shall insert the following statement being the result of the experience of Colonel Le Couteur, one of the deputies from the island of Jersey. Three years ago this gentleman became acquainted with professor Le Gasca, one of the most celebrated botanists of Europe, who had been curator of the Royal Gardens at Madrid, and obliged to leave Spain, where he is now again restored to his friends and former situation. The professor was then growing about eighty sorts of wheat in the garden of Mr. Saunders, nurseryman in Jersey. The variety, classification, and beauty, struck Colonel Le Couteur, who sought to procure all the information he could from professor Le Gasca. The latter told him that for the last twenty-five years he had been employed in studying the properties and characters of wheat, and had collected in the Royal Gardens nine hundred varieties and subvarieties. He came to Colonel Le Couteur's farm, and picked more than twenty sorts out of three fields then (in August) growing and gave daily all the instruction and information wanted by Colonel Le Couteur, who resolved to profit by such an opportunity, and began seriously to cultivate the important plant of wheat, so as to procure the several sorts distinct from each other, and keep notes of the experiments made on the culture, produce, weight of the grain, and qualities of the corn, flour, and straw.

Colonel Le Couteur has kept a most minute account of his experiments, and taken the greatest care to preserve the best sorts in their purity. He has in London nineteen varieties of the greatest beauty and such as the frequenters of Mark Lane say could not be matched in England for purity.

The Colonel, after three years' experience, has arrived at this conclusion—that the proper mode of cultivation of wheat is yet unknown or unpractised.

That it is of consequence to keep the several sorts to grow apart, because they all ripen at different periods, and that bread made of ripe and unripe corn could neither be so wholesome nor nutritious as when made of ripe corn without the mixture of that which had not been well ripened.

That each sort will thrive best on a particular soil and situation adapted to it.

That one ear of a particular variety, sown grain by grain, and suffered to tiller apart, produced 4lb. 9 oz. of wheat; whereas another ear of an inferior sort, treated in the same manner, produced only 1lb. 13 oz. Hence it is of importance to select the sorts that are the most farinaceous and productive.

That by sowing each sort apart, they might be easier saved and harvested in rotation, some sorts ripening a fortnight before the others. That the same quantity of wheat of a farinaceous kind may maintain a family of fifteen persons twelve months, where the same quantity of another kind, though apparently fine corn, will maintain them only nine months.

The following extract from an article by Mr. Gorrie, in Messrs. Drummond's third report, will show that nature has been equally profuse in presenting to the attention of the farmer an ample variety of plants, wherewith, to improve his meadows and pastures:—"out of more than two hundred grasses suitable to our climate, it may be said that only one genus, the rye-grass, has as yet received general culture. From among sixty species of clover, only three or four species receive general attention. Of the genus lotus. sixteen species are hardy; and in waste lands two species contribute to enhance the value of the pasture; but in agriculture, they are seldom noticed. The species of melilot are as numerous, many of which vie with our common clover, and form excellent substitutes when land is clover sick, yet that genus is almost quite neglected. The same may be said of many species of *vicia*, *lathyrus*, *orobus*, *medicago*, and other diadelphous plants, which point out the apathy and remissness of the farmer. Hence it is obvious that agricultural societies, as hitherto conducted, however efficient in other departments, have failed in exciting sufficient attention to the nature of vegetables."

The statements demonstrate most satisfactorily the vast capabilities, which exist in the living functions of grain and grasses, and the successful results of horticulture go far to establish the existence of a like susceptibility in the roots available for agricultural purposes. Indeed, the selection and propagation of improved agricultural seeds has till lately been very little attended to. But the subject has been taken up by Mr. Sinclair, of New Cross, Mr. Sherriff, of Mungoswells, Mr. Gorrie, of Rait, and others; and we have little doubt some greatly improved varieties of our more useful field plants will be the result. Mr. Sherriff mentions (Quar. Jour. Ag., vol. i. page 366,) that the variety of the Swedish turnip, cultivated in East Lothian had, by judicious selection of roots from which seed was saved, been improved in nutritious value upwards of 300 per cent. "Potatoes and Swedish turnip," Mr. Sherriff says, "appear to be susceptible of farther improvement by judicious selection, as well as the different grains so long cultivated in this country, and which in almost every instance have become spurious. But whatever may be the degree of improvement of which the agricultural produce of the country is susceptible, by the propagation of genuine seeds of the best varieties of plants, one remarkable feature of such an improvement is, that it could be carried into effect without any additional investment of capital, or destruction of that already employed.

The facility of propagating genuine seeds will become manifest from a statement of my practice. In the spring of 1823, a vigorous wheat plant, near the centre of a field, was marked out, which produced sixty-three ears, that yielded 2,473 grains. These were dibbled in the autumn of the same year, the produce of the second and third seasons sown broadcast in the ordinary way; and the fourth harvest put me in possession of nearly forty quarters of sound grain. In the spring of this year I planted a fine purple top Swedish turnip that yielded (exclusively of the seeds picked by birds and those lost in thrashing and cleaning the produce) 100,296 grains, a number capable of furnishing plants for upwards of five imperial acres. One-tenth of an acre was sown with the produce in the end of July for a seed crop, part of which it is in contemplation to sow for the same purpose in July, 1829. In short, if the produce of the turnip in question had been carefully cultivated to the utmost extent, the third year's produce of seed would have more than supplied the demand of Great Britain for a season.

Plants and animals equally belong to the class of organic beings—both are endowed with sexual organs, from whose germs an offspring proceeds, which in its turn exercises a propagating power; so that in taking a comprehensive view of the subject of agricultural improvement, and especially of what may be effected through the agency of seeds, we find the same laws to a considerable extent acting in both cases. However important we may deem a knowledge of the subject of the propagation of live stock, attention to the selection of the seeds of plants is no less so, but, on the contrary, is of still greater moment, in as far as it embraces the improvement not only of the herbage which supports the inferior animals, but of those plants, part of which forms the direct ingredients of human sustenance. The analogy just adverted to, existing between animal and vegetable life, is exemplified in the sexual union, which, under certain favorable circumstances, takes place between varieties of the same species of plant, giving rise to a new race partaking of the properties of both parents, and which is termed hybrid. New hybrid varieties of agricultural plants, when suffered to intermingle with the original kind, disseminate their influence around them like cross-bred animals, unrestrained in their intercourse with the general herd, till the character of the stock becomes changed, and consequently deteriorated or improved. In either case, propagation from the best variety alone, would be attended

with good effects. The principles of propagation in vegetable and animal life are, as has just been hinted, nearly the same; but the propagation of vegetables must exceed that of animals in importance in an economical point of view, as much as the vegetable produce of the country surpasses that of its animals in value. Indeed, animals may justly be considered mere machines for converting our inferior herbage into a higher species of nutriment; grasses and roots being likened to the raw materials, butchers' meat to the manufactured commodity.

The importance of attending to varieties of cultivated plants has been ably pointed out by Mr. Bishop, at once a scientific botanist and an experienced practical gardener. "By means of varieties," he says, "the produce of our gardens and fields are not only increased in a tenfold degree, but the quality of the produce is improved in a still greater proportion. In them we perceive the labor and assiduity of man triumphing over the sterility of unassisted nature, and succeeding in giving birth to a race of beings calculated to supply his wants in a manner that original species never could have done. The difference between varieties that have sprung from the same species fits them for different purposes, and for different soils, situations, and climates. Some, by reason of their robust nature, are winter vegetables; and others, by being early, are spring vegetables; while some are in perfection in summer, and others in autumn. The fruit produced by some is fit to eat when pulled off the tree; while the fruit of others is valuable by reason of its keeping till that season when nature rests to recruit her strength. Thus, in edible plants and fruits, we are supplied with an agreeable change throughout the year, from a difference in varieties that have sprung from the same species. In the earlier ages of the world, no idea could have been entertained of the excellence, some varieties have attained over their originals. Who, upon viewing the wild cabbage that grow along our sea-coast, would ever imagine that cauliflower or brocoli would have been produced by the same? Or who would expect the well-formed apple of a pound weight from the verjuice plant in our hedges? Many instances might be noticed of original species that are scarcely fit to be eaten by the beast of the field, the varieties of which afford a nutritious and wholesome food for man. Upon comparing the original variety of the *Daucas carota*, the *Pastinaca sativa*, and some others indigenous to our climate, with their varieties produced by culture, we are struck with their great inferiority, and cannot help reflecting on the hapless condition of that hungry savage who first taught us their use; for nothing short of the greatest privation could ever have led to that discovery. Indeed, nothing is more obvious, upon comparing original species with their varieties produced by culture, than that we, by means of the latter, enjoy a vegetable food far preferable to our forefathers—a circumstance, from which it may be inferred that posterity is destined to enjoy a better than that which we do now. For although it is reasonable to believe that there exists a degree of excellence attainable by varieties over the species whence they have sprung, yet as that degree is unknown, and as it is probably beyond the power of man, of cultivation, or of time, to determine the same, we are justified in regarding it as progressive, and in considering the production of a good variety as the sign or harbinger of a better.

The power of distinguishing varieties, and of forming some idea of their worth at sight, is an attainment much to be desired, because valuable varieties may sometimes appear to those who have it not in their power to prove by trial; and if they have, the probability is, that the means to be employed require more care, time, and attention, than they are disposed to bestow on plants, the merits of which are doubtful; whereas, were such persons capable of forming an estimate of the worth of varieties from their appearance, then would they use means for their preservation, whenever their appearance was found to indicate superiority. That this is an attainment of considerable importance will be readily allowed; yet, that it, in some cases, requires the most strict attention, appears from the circumstances of varieties being oftentimes valuable, though not conspicuously so. Let us suppose, for instance, that in a field of wheat there exists a plant, a new variety, having two more fertile joints in its spike, and equal to the surrounding wheat in every other respect: a man accustomed to make the most minute observations would scarcely observe such a variety, unless otherwise distinguished by some peculiar badge; nor would any but a person versed in plants know that it was of a superior value if placed before him. How many varieties answering this description may have existed and escaped observation, which, had they been observed and carefully treated, would have proved an invalable acquisition to the community! The number of fertile joints in the spike of the wheat generally cultivated, varies from 18 to 22; and the inhabitants of Great Britain and Ireland amount to nearly the same number of millions; therefore, as the wheat produced in those islands has been of late years sufficient, or nearly sufficient, to supply the inhabitants thereof with bread, it is evident that a variety with two additional fertile joints, and equal in other respects to the varieties at present in cultivation, would, when it became an object of general culture, afford a supply of bread to at least two millions of souls, without even another acre being brought into cultivation, or one additional drop of sweat from the brow of the husbandman.

The same varieties are not repeatedly produced by culture; if they were, there would not exist that necessity for strict observation and skill on the part of the observers, because, if a variety be lost or destroyed, we might look forward to its reappearance; or did we possess the power of producing varieties, and of producing them late or early, tall or dwarf, sweet or sour, or just as we might wish to have them, then might we plead an excuse for inattention. But experience shows, that when a variety is lost, it is for ever lost, and the slightest reflection cannot fail of convincing us that our power of producing them is most limited. Indeed, our knowledge only enables us to produce those of the intermediate kind, while varieties that confer extension or excellence are as likely to be produced from the seed sown by the humble laborer, as from that sown and treated by the ablest horticulturist, the most skilful botanist, or most profound philosopher of the age. From these remarks it is obvious that the benefits mankind derive from the varieties produced by cul-

ture are numerous and important, and that the discovery of those of merit is an object highly deserving of our attention. They also prove more especially that of Colonel Le Couteur, that the development of these is a matter attended with no small difficulty, from the delicacy, the minuteness, and the science with which the experiments require to be conducted, and here the immense superiority of an experimental establishment for the accomplishment of these ends, will appear in a very prominent point of view. Not only could the observations of such men as Colonel Le Couteur, Mr. Gorrie, Mr. Bishop, and Mr. Sherriff be most carefully attended to and practically applied, but by means of the subsidiary associations the whole would be conducted on a scale commensurate to the wants of an extensive country.

By assigning to each variety a distinct space, the different sorts would be kept apart while growing, and a series of accurate observations instituted as each successive development took place during their growth, as well as after they had arrived at maturity, which could not fail to be attended with the most successful and beneficial results. And not only so; by means of the local institutions the situation and the soil best adapted to each might be discovered, and the different varieties would thus not only be purified, but, what is perhaps of equal importance, characterized. In this way the uncertainty at present inseparable from the practical results of every agricultural operation would be removed, for the farmer could select with the most unerring accuracy the particular sorts best adapted to his climate, soil, &c.

It has been objected by some that no single establishment could be made applicable to the variety of soils, climates, &c. of Scotland. This objection, however, may be completely obviated by attending to what may be termed the working machinery of an experimental farm, as fully detailed in the original suggestions. It is there stated that a connected line of communication, by means of lateral branches in every country, is essentially necessary to the success, and, indeed, forms part of the scheme; and we would here farther suggest, that the ground set apart for experiments by these local associations, and the different museums in connection with them, should be entrusted to the management of an experienced nurseryman or gardener. We have no doubt that many among this numerous and intelligent class might be found both competent and willing to undertake the task, more especially as the details they would be called upon to superintend are so intimately connected with the subject-matter of their own profession; and, if so, those scientific attainments which have hitherto been confined to a comparatively circumscribed sphere, would be brought to bear upon the rural economy of the country, and the co-operation of individuals would be secured who were in every way qualified both to act as a check and an assistance to the parent establishment—as a check, by testing and verifying the report of the chief manager—as an assistance, by furnishing accurate and scientific statements of the several matters intrusted to their care.

It has been also objected that from the richness and highly pulverized nature of nursery and garden grounds, no just estimate could be formed of a specimen from the grain produced on them. Now, were the method of preparing the soil, which we have detailed so fully in a preceding article, generally practised and properly executed, it is not too chimerical to expect that the whole arable land of the country would eventually become almost as rich and as highly pulverized as any garden or nursery grounds can well be. As a considerable time, however, even under the most favorable circumstances, must elapse before this can be accomplished, the uncertainty arising from the above cause might, in the meantime, be easily removed. Suppose, for example, that some particular variety has been discovered, evincing a decided superiority in its apparent productiveness, &c., over the rest, the manager has only to obtain permission from some of the neighboring farmers (which we are certain would be most cheerfully granted) to allow it a place for trial, on such soils and in such situations as may be deemed best adapted to bring its virtues to the test. By this simple arrangement the peculiar qualities of every variety would be practically certified before it received the recommendation of the establishment, and the nurserymen or gardeners, while they operated as a check and an assistance to the parent establishment, would themselves be operated upon in like manner by those individual farmers with whom they found it necessary to hold communication.

The whole country would thus be converted into one wide field of experimental inquiry, which could not fail most effectually to correct at the true source all those evils which arise from the sudden and frequently injudicious introduction of any new variety of seed. For at present it often happens, as every agriculturist knows, that a newly discovered variety is approved of or condemned, not from its own intrinsic qualities or merits, but from the treatment it receives, or the accidental state of the weather during the season in which it might have been introduced. This has been the case with several varieties of oats since the commencement of the present century; and who can tell whether or not the chevalier barley, which has been lately introduced into this country so rapidly and to so great an extent, would maintain its vaunted superiority over the other varieties if subjected to the ordeal of a series of late seasons.

We shall now briefly advert to the national advantages which might reasonably be anticipated from the operation of such an establishment. In order to perceive these, the annual amount of grain, potatoes, turnips, grasses, &c., would require to be ascertained.

According to M'Culloch the annual consumption of grain in the United Kingdom amounts to 52,000,000 quarters, and the imports of foreign corn in 1831 amounted to 3,541,809 quarters, being the largest quantity ever brought into Great Britain in any one year.

Now assuming that the annual consumption is 52,000,000 quarters, inclusive of seed, and that the annual average of native growth amounts to 50,000,000 quarters, let us advert to the results of Colonel Le Couteur's experiments. There we find one variety of wheat 250 per cent. more productive than another, and it will certainly not be thought unreasonable to assume that the produce might be increased to the extent of 10 per cent. not only on grain, but also on roots, grasses, &c.

We thus perceive that in a national point of

view the scheme is pregnant with the most important advantages to the British empire, and therefore well worthy the attention of the enlightened and philanthropic statesman. It may also serve to show how chimerical and crude the theories of those alarmists are, who would terrify us with the dread of a superabundant population. In the language of the eloquent author whom we have already had occasion to quote, "Cultivated produce has hitherto outrun population, and to all appearance will always do so. From the increasing enterprise and science of agriculturists, not only the merits of many of the varieties of grain, roots, and grasses, &c., now in existence and as yet very little known, will be more fully elicited, but new varieties, and even genera possessed of more useful properties than any of those now cultivated, will continue to be discovered. From the facts we have adduced, and the extraordinary phenomena constantly occurring in the vegetable kingdom, this is by no means improbable. Be this, however, as it may, two laws are visibly operating in nature—one that its produce shall always be increasable by human labor and skill. Ordinary but diligent exertions of these have hitherto abundantly sufficed for all that has been needed. Local distress, indeed, may arise from temporary seasons, but never from a failure of the powers of vegetable nature."

From the Maine Farmer.

INCREASED USE OF LIME IN MAINE.

It is gratifying to notice the increasing inquiry respecting the best mode of raising grain crops, and the consequent call for, and application of those articles which are found essential to the growth and perfection of the kind of seed sown. The disposition which now manifests itself, is greatly owing to the stimulous which has been given by the state in the shape of a bounty on the wheat crop; and farmers, who have thus become roused to the importance of cultivating this crop themselves, very naturally turn to the means for doing it best. Wherever lime has been properly used it has been found to be a profitable and even essential article, and there is much enquiry for it. Hitherto the trouble of obtaining it, has prevented many from using it as they would. We hope that this difficulty is vanishing, for it has been found that in every county large deposites of limestone exist; if not pure enough for many of the purposes of the arts, yet sufficiently so for all agricultural wants. Even if this were not the case, the immense formations of the best of limestones in the counties of Waldo and Lincoln, and in other places on the seaboard, can supply the whole union with this article for centuries to come; and it is with pleasure that we learn that some of our Kennebec friends are making arrangements to keep a large quantity of fresh burnt lime constantly on hand, and to be sold at a rate which will satisfy every farmer and induce him to lay in a store of it for the use of his farm and compost heap.

While upon this subject we would refer the reader to the following remarks of Mr. Ruffin, Editor of the Farmers' Register, who has done more than any other man to enlighten people upon the nature and uses of lime or calcareous manures. In commenting upon a letter written by our venerable friend, Charles Vaughan, esq., upon culture of winter wheat, he says, "The reader of the foregoing piece (Mr. V.'s letter) should bear in mind the great difficulty and uncertainty of raising wheat in Maine, which have operated so strongly on most farmers, as almost to stop the culture, and on others to seek relief in the substitution of spring wheat and other inefficient remedies.

The legislature has entered upon the field of controversy, and by the offer of a bounty on every bushel raised, expect to bear down the existing obstacles to wheat culture in Maine.

This bounty, (on the policy of which we commented at page 692, vol. iv. of the Register,) it is said will have the effect of increasing enormously the crops of wheat raised in Maine—but will not remove or lessen the true and great obstacle, (*the want of lime in the soil,*) and the increase will probably be purchased at a dear rate by the treasury bounty. Let the legislature of Maine induce (whether by bounties, instruction or otherwise,) the application of calcareous manures on the lands now so deficient in that necessary ingredient, and their thence newly acquired fitness for wheat will cause the culture and success of that crop, without a distinct legislative bounty for its production. In the last paragraph of Mr. V.'s letter, there is a strong confirmation of our opinion upon this subject, (which we have stated more at length before, in the remarks referred to above,) *in the fact that newly cleared wood lands on which the wood has been burnt, produce wheat with great certainty.* Now the only cause of this, is that the ashes of the trees supply the land for one year with a sufficiency of carbonate and phosphate of lime to be taken up by the wheat, and which ingredients, in unusually large proportions, are essential to the healthy existence of that crop. If the intelligent and public spirited editor of the *Maine Farmer* will exert his influence to have the trial of calcareous manures fairly and fully made on proper soils in Maine, we will hazard any reputation that we may possibly possess, by the prediction that the alleged obstacles to that culture, of climate, &c. will be found no longer to be very important."

In answer to the above remarks of Mr. Ruffin, we would with deference say—that we differ only in the means of obtaining the same object. After some seven or eight years' labor in the cause with but partial success, we found it necessary to change the shape of the contest, and rouse our farmers by some immediate and personal incentive to the production of wheat. This has been effected by the bounty.

There is no better way to rouse a people to simultaneous action than by touching their interests. Make it evident to them by the shortest and least possible amount of reasoning that it is for their interest to do this or that, and they will soon start an inquiry into the *ways* and *means* for doing it. Hence the increase call for lime, and consequently the increased exertions made to supply the call, and, beyond a doubt, the increased supply of bread raised within our borders in future.

From the Genesee Farmer.

TENDENCY OF SOILS TO DETERIORATE.

The natural, the inevitable tendency of all cultivation of the soil, is deterioration. The richest

and most fertile, contain but a certain proportion fit for the purposes of vegetation; and every crop taken from the soil, sensibly lessens this quantity. The result therefore must be, that continual cropping will reduce the best soils to barrenness, until, where circumstances admit, nature by her gradual method of repairing wrongs, imparts a degree of fertility. It is however possible to counteract this tendency to sterility in soils; to prevent the exhaustion of the qualities necessary to support vegetable life; and the difference between good and bad farming, or proper and improper cultivation, may be determined mainly by a reference to this single result.

In this country we can hardly form a correct idea from any thing around us, of the frightful barrenness to which fertile soils may be reduced by improper management. Cultivation is here so young, that had it been of the worst description it would hardly have been possible to have exhausted so soon the treasuries that had for centuries been accumulating in our soils. Still there are examples in the United States, where soils have nearly reached that point from which a restoration to fertility is impracticable. Soils of a silicious nature, or that are inclining to sand, are the most easily and quickly reduced. Of this the south-east part of Massachusetts, and parts of the southern states at the present time, and parts of Long Island as it was some thirty years ago, furnish striking proof. When cultivated without regard to consequences, the nutritive part of such soils is quickly exhausted; the little vegetation produced is not sufficient to prevent the burning effect of the sun; the roots of the grasses are unable to fix and bind the soil; it becomes loose and floating; plants root themselves with more and more difficulty, and at last what was once a fertile plain becomes a sandy waste, where cultivation is impossible.

It is in the old world that this process of deterioration may be the most clearly traced: To renovate, seems to have formed no part of the ancient profession of agriculture. In all the writings of antiquity there is scarcely a hint that manuring, or in any way improving cultivated lands, was practiced to any extent. Now and then, where nature had set the example of imparting fertility by the annual overflow of rivers, man seemed inclined so far to imitate her works, and irrigation for ameliorating land was frequently adopted. But this was about the extent of ancient attempts at improved cultivation, and the result has been such as might confidently have been predicted. The regions of the east that two or three thousand years since were as the garden of Eden for beauty and fertility, have gradually become sterile and worthless; and tracts of country that once supported a thriving and industrious population, have from the action of the causes alluded to above, become deserts, in which the solitary camel can scarce find a shadow of vegetation to supply his easily satisfied wants. Mesopotamia; parts of Syria and Palestine; Edom, and parts of Arabia Felix; many parts of the North of Africa; and no inconsiderable portion of Asia Minor, have thus become hopelessly barren. The finest of wheat can now no longer be grown, on the plains where once the reaper filled his arms with the yellow sheaves. They were ceaselessly cropped, until the soil was so exhausted, that the unaided efforts of nature were unable to restore fertility, and the result is perpetual barrenness.

To counteract this tendency to sterility, is the business of the farmer; and on the possibility of doing this, rests the whole system of improved agriculture. Science has here come to the aid of the cultivator of the soil, and by revealing the agents and promoters of fertility has greatly assisted and simplified the processes without which all would be still doubtful and uncertain. The action of manures has been ascertained; the value and activity of the various salts formed by the decomposition of animal and vegetable matter in part determined; the aid which the mineral earths afford vegetation has been carefully examined; and these combinations of soil the best calculated to induce fertility been accurately investigated. It has been shown that to take from the soil, without making corresponding returns, is suicidal policy, and that if this point is properly attended to, land can be cropped without danger of deterioration.

Manure then, is the sheet anchor of the farmer. It is to this source of fertility he must look for the renovation of the soil, and the means of continued productiveness. And it is to manures produced from his fields, from his herds and his flocks, from decayed vegetable and animal matter, that he must look for this result. These are the true fertilizing ingredients; and though other agents may be useful as exciting these to action, yet these may be considered as constituting the food of plants, the cause of growth and nutrition. The application of the exciting mineral manures, such as lime and gypsum, is productive of the happiest effects, for the reason assigned above; yet they are not so absolutely essential to the improvement of the soil as those that have a vegetable or animal origin. Matter which has once lived, which has already taken the forms of organized existence, more readily assumes the forms of organized life, and is more easily assimilated, than that which has never undergone such a change. It is the office of the vegetable to take the crude atoms of matter as they exist in the soil, and prepare them for the support of animal life; and when this has once been done, though a partial decomposition may have been effected, a renewal of the process is comparatively easy and certain.

In connection with the preparation and application of manures, the next most important step which modern agriculture has taken to prevent a deterioration of the soil, is rotation in crops. Judiciously conducted, the result is certain; exhausted lands are restored, and the profits of the agriculturist greatly increased. It was formerly the custom to let land suitable for grass remain for that purpose alone; while those suitable for the plough were annually subjected to its use until exhaustion forbid. It was then left to the restoring processes of nature. There were at the beginning of this century, lands in the farming sections of England which it was well known had lain in grass for five hundred years, and there were other tracts which had been as constantly submitted to the plough, or at least as often as the soil promised to repay the expense of cultivation. This system has been abandoned; a more enlightened system of agriculture has prevailed; and the products in consequence have been more than doubled. The course of rotation is indeed variable in different districts, both in Europe and in this

country, but it is founded on the same great principle, that different plants take up different ingredients from the same soil, and from different depths, and that a new plant will flourish in a soil where one of the same kind previously cultivated could not succeed at all. Thus in England, in Holland and Belgium, in some parts of Germany and France, and in some few instances in this country, a regular course of cropping adapted to the soil, has been adopted with the happiest effect. This course which varies from three to six years, according to circumstances, embraces roots, grains, and grasses, and taken in connection with thorough manuring, which this system enables the farmer to practice, not only improves the quantity and value of each kind of crop, but is deepening, enriching and fertilizing the soil. Manure, and the rotation of crops, are then the great means to which we must look to preserve our now fertile plains from the fate which has overtaken so large a part of the east; and they are fortunately both easy of application, and entirely within our reach.

From the New England Farmer.

FATTENING SWINE.

Judge Peters of Pennsylvania, formerly President of the Philadelphia Agricultural Society, stated that "sour food is most grateful and alimentary to swine. One gallon of sour wash goes farther than two of sweet. I mean the wash acidulated to the degree necessary for distilation, not aceteous." Mr. Arthur Young likewise observes that "the most profitable mode of converting corn [grain] of any kind, into food for hogs, is to grind it into meal, and mix this with water in cisterns, in the proportion of five bushels of meal to one hundred gallons of water; stirring it well several times a day, for three weeks in cold weather, or a fortnight in a warmer season, by which it will have fermented well, and become acid, till which, it is not ready to give. The mixture should always be stirred immediately before feeding, and two or three cisterns should be kept fermenting in succession, that no necessity may occur of giving it unduly prepared."

Judge Peters also observed that "dry rotton wood kept constantly in styes, for fattening hogs to eat at pleasure, is a good thing; but I will take the liberty to mention what I think a better. We have blacksmiths in this town, and my hogs eat up all the *ashes* or *cinders* they make; we haul it into the pens by cart-loads, and the hogs will devour this at times, with more avidity than their ordinary food."

Charcoal it has been said, will answer as good or a better purpose than either cinders or rotton wood. If swine are supplied with a quantity of coals, (according to the statements of several persons who have tried the experiment, say two pieces a day to each, about the size of a hen's egg, they will discontinue rooting, remain more quiet, fatten faster than they will otherwise. Charcoal will operate on the human frame as a cathartic, and probably will have the same effect on the animal of which we are treating. If so, it may supercede the necessity of using brimstone, antimony, and other dungs, with which hogs are often dosed. At any rate, it will cost but little to give them constant access to coals, which may be sifted or raked from your fire-place, and they will be induced by instinct, to consume such quantities as will promote their health and expedite their fattening.

When you first commence fattening swine, care should be taken not to give them more than they will eat with appetite. If they become gorged or cloyed, their thriving is retarded, and there is danger from staggers and diseases consequent on repletion, or the gormandizing propensities of those four-footed epicures.

The practice in Scotland, is to rear swine chiefly on raw potatoes, and to fatten them on these roots, boiled or prepared by steam, with a mixture of oats, barley, or bean and pease meal. Their troughs should be often replenished with a small quantity of food at a time, and kept always clean, and seasoned occasionally with salt.

An English farmer fattened eight pigs in the following manner, which may be recommended in case where a constant and regular attention cannot be given to feeding the animals. He placed two troughs in the stye: one he filled with raw potatoes, the other with peas, and gave no water. When the pigs were thirsty they ate the potatoes. In this way, it is probable; that the animals could not only do without water, but likewise needed no brimstone, antimony, nor any other medical substances, for raw potatoes are cooling and drastic; and may serve at once for food and physic. Instead of peas, probably dry Indian corn, or dry Indian meal might be substituted.

Rubbing and currying the hides of fatting hogs, is not only grateful to the animals, but conducive to their health and thriftiness. In every stye, a strong post should be fixed for them to rub against. They should have plenty of litter, which will not only be the means of contributing to their comfort, but increasing the most valuable manure.

The following mixture for fattening swine, has been recommended, and we believe would prove useful:

Wash potatoes clean, boil and mash while hot, mix in at the same time, oats and pea meal. Put the mixture into a large tub, which must stand till it become a little sour, but not very acid, nor in the least putrid. Keep a quantity of this on hand fermenting, and give it to your hogs as often as they will eat. It is asserted that pork may be fattened in this way, and making a saving of one-third of the food and time consumed in the usual mode.

From the Horticultural Register.

BARTRAM, THE SELF-TAUGHT AMERICAN BOTANIST.

John Bartram, the celebrated and self-taught philosopher and botanist, was born in 1704, at Darby, in the county of Delaware, Pennsylvania. His grandfather of the same name, came over from Derbyshire in England, with the adherents of William Penn, in 1682. Early in life he manifested an ardent thirst for knowledge; but the great distance from Europe, then the seat of arts and sciences, and the infant state of the colony, rendered it difficult to obtain even a moderate education. The difficulties of his station, however, yielded to the resources of his own mind, and intense application. Associating with the most respectable characters, he obtained the rudiments of the learn-

ed languages which he studied with extraordinary industry and success. So earnest was he in the pursuit of learning, that he seldom sat at his meals without his book; his victuals being in one hand and his book in the other. He had an early inclination for the study of surgery and medicine, and acquired so much knowledge as to administer great relief to the indigent and distressed in his neighborhood; and as most of his remedies were drawn from the vegetable kingdom, he had an opportunity to prosecute the study of botany, which was his favorite object, together with natural history. Bred a husbandman, he cultivated the ground as the principal means of supporting a large family, and attentive to the economy of nature, and observing the minutest operations, he prosecuted his labors as a philosopher. When ploughing or sowing his fields, or mowing his meadows his inquisitive mind was exercised in contemplating the vegetable system and animated nature.

He was the first American who conceived and carried into effect the design of a botanic garden, for the reception and cultivation of American vegetables, as well as exotics, and of travelling for the acquisition of them; and for the purpose of accomplishing this scheme, he purchased a plantation in a delightful situation on the banks of the Schuylkill, about five miles from Philadelphia, where he laid out with his own hands, a large garden, containing six or seven acres, comprehending a variety of soils and situations, which he soon furnished with an abundance of the most curious and beautiful vegetables, collected in his numerous excursions in different parts of the country, from the Floridas to the Canadas. Botany being his favorite pursuit, he soon made such proficiency in it, that the great Linnæus, said in one of his letters, that he was the greatest natural botanist in the world. His progress in botany, natural history and philosophy, attracted the notice and esteem of the principal literary and eminent characters of America; among whom were James Logan, esq., Dr. Franklin, and Dr. Kennersley, of Philadelphia, Dr. Colder of New York, and Dr. Clayton of Virginia; and introduced him to the correspondence and friendship of Peter Collins, esq., which continued for nearly fifty years, and terminated only with life; Lord Petre, Dr. Dellenius, Dr. Hill, Gronovius, Linnæus, Professor Ralm, Sir Hans Sloane, Mr. Casteby, Dr. Fothergill, Mr. Wrangle, &c., who furnished him with such books, philosophical apparatus, &c., as his genius and situation required, thereby lessening the difficulties with which he had to struggle in a newly settled country, and promoting the object which his benevolent mind had contemplated, in communicating his discoveries and collections to Europe. These communications occasioned him to be employed in collecting whatever was new and curious, to furnish and ornament the European gardens and plantations with the productions of the New World. His industry and success in the pursuit of science procured him fellowship in many literary and scientific societies in Europe, as those of London, Edinburgh, Stockholm, &c., and at last he was appointed American Botanist to George the Third, in which appointment he continued till his death, in September, 1777, in the 76th year of his age.

He employed much of his time in excursions through the provinces then subject to England, chiefly in autumn, when his agricultural avocations least required his presence at home. The object of these journeys was to collect rare and nondescript vegetables, fossils, &c. His ardor was such, that at the age of seventy he made a journey into East Florida, to explore the natural productions of that country. His travels among the native Indians were attended with much danger and difficulty, and the different parts of the country, from the shores of lake Ontario and Cayuga, to the source of the river St. Juan, contributed through his hands to enrich and embellish the grounds and forests of Europe with elegant flowering shrubs, plants, and useful and ornamental trees.

He was an ingenious mechanic. The house in which he lived he built himself, after quarrying the stone; and he was often his own mason, carpenter, blacksmith, &c., and generally made his own farming utensils.

His stature was rather above the middle size, erect and slender, of a sandy complexion, and cheerful countenance, with an air of solemnity, his manners were modest and gentle. Amiable of disposition and liberal in mind, he was a lover of charity and social order; and active and temperate, he always maintained a plentiful table; and annually, on New year's day, he gave an entertainment at his own house, consecrated to friendship and philosophy. He was an advocate for liberty; and born and educated in the society of friends, he led a peaceful, useful and pious life.—*South. Paper.*

From the Horticultural Register.

ON THE GERMINATION OF OLD SEEDS.

The germination of seed, supposed to have lost their vegetative principle, may be greatly accelerated by immersing them in oxalic acid, or putting them in a cloth moistened with the acid. They are not to remain in the cloth any longer after the germination has commenced. By attending to the foregoing, seeds have vegetated after being kept thirty years.

From *L'Echo du Monde Savant.*

DEEP ARTESIAN WELL.

The Artesian well at the abbatoir, near the Barrière de Grenelle, becomes every day more interesting. The boring has already reached the enormous depth of 1360 feet. Whatever may be the result of this undertaking, says the Prefect of the Seine, in his last report to the municipal council, it cannot but be interesting to geologist, from its connexion with their science; and to the industrious, from its pointing out the chance of success in similar trials. Success will lead to another result, already foreseen by philosophers, which consists in the high temperature of such a well: consequently, the water may be instantly employed in warm baths.

This well was commenced on December 30th 1833; and, during the 1200 days which have elapsed since then, the works have been directed by M. Mulot, jun., and have not been discontinued for a single day. From this it appears that the average progress has been upwards of one foot one inch per day.

It seems that the administration are about to make an engagement with M. Mulot to bore to the depth of upwards of 1800 feet, if water be not met with before reaching this depth.

From the American Turf Register.

OESTRUS EQUI—BOTS OR GRUBS.

Hanover, Va. March 10, 1833.

Mr. Editor: As I think it probable that much mischief is attributed to the bots or grubs, which, if correctly understood, would be justly ascribable to other causes, I have thought the following account of that insect, its production, and the circumstances of its existence, might not be unacceptable to the public.

The bots are the larvæ of a fly known to naturalists as belonging to the family of the *oestrus* or *gad fly*, and is called in natural history *oestrus equi*, and more extensively known to the people of this country under the vulgar denomination of the *nit fly*. The *oestrus equi* makes its appearance, in our climate, from the latter part of July to the middle of August. The female becomes impregnated very soon after her escape from the chrysalis, and soon begins to deposite her eggs, which she continues to do from that time to the end of autumn, when she falls a victim to the chills of the season. It requires but little talent for observation to discover that this fly, on her arrival in a field where there are several horses, soon manifests a preference for some one of them, and attaches herself to this one with so much constancy, that though she may be driven off repeatedly, she will still pertinaciously return, though she may have uninterrupted access to others. It is impossible to point out with certainty the circumstances on which this preference depends. Whether the oestrus possesses the instinctive faculty of discovering certain marks of cutaneous irritation about one animal, which renders him more disposed to bite and pinch at the integuments with his mouth than another, and thereby more certain to give her eggs a conveyance to the future nidus of the larvæ; or whether she observes that the hair on one horse is arranged in a manner that renders it more easy of access for the deposite of her eggs than that of another; or lastly, whether her attachment depends on the more or less patient civility with which different horses receive her buzzing addresses, must be left for the determination of the sagacious reader. The fact, however is so; and the insect having fixed on the object of her choice, commences immediately the deposite of her eggs in the following manner, which no doubt is perfectly familiar to most of your readers.

Having poised herself in the air in the vicinity of the part on which she intends to deposite the eggs, (and this is most generally about the knee, the inside of the fore leg, the rear of the shoulder, and more rarely on the mane,) with her head elevated, her body in nearly an erect position, and her long and slender tail curved inwards and upwards in a manner that brings it nearly in contact with the erect abdomen, she every now and then darts at the subject with great quickness, at the same time suddenly throwing her tubular tail from its approximation to her body, so as to form a right angle with her erect position, and shooting forth the egg from its capsule, (by means of certain muscles that perform that office,) it is attached to a single hair, (which she strikes with unerring certainty,) by a glutinous fluid, which also answers the purpose of lubricating its exit from the *viscus* containing it, and when dry, of confining it firmly to its new situation. The egg thus deposited has been supposed by the unobservant to be licked or pinched off occasionally by the animal, and swallowed with the hair to which it is attached, and hatched in the stomach. A little reflection, however, would satisfy us of the improbability of this; for the inanimate egg would most probably blend with the food, and pass off with the excrementitious substances from the bowels, without hatching; thereby frustrating the object of nature in the whole arrangement.

Mr. Clark has discovered, and communicated to the Linnæn Society, among other interesting facts in respect to the oestrus, that the egg becomes ripe for animalization in four or five days from its deposite, and that at its highest state of maturity it is almost instantly quickened on meeting with warmth and moisture. There can be no doubt, therefore, that the egg, if received into the mouth, or even licked with the tongue, at this auspicious period, is instantly hatched, and that the small larva, ejected from its operculum, readily attaches itself to the parts about the mouth and fauces, and is either carried to the stomach with the saliva, or with the water or food in their passage thither, where it soon attaches itself to the *villi* of its inner coat by means of two hooks or *tentacula;* one of which is situated on each side of the longitudinal aperture, through which the larvæ evidently receive their food. Hooked in this manner to the inner coat of the stomach, its residence may be considered fixed: for I imagine these larvæ never leave the situation they chance at first to occupy in the stomach of the horse till they arrive at the insensible state of the chrysalis, when they drop off as a matter of necessity, just as ripe fruit drops from the tree. Loosened from its hold on the villi of the stomach, it soon blends with the contents of that organ, passes into the bowels, and is ejected with the excrementitious matter. Incapable of locomotion, it is now dependent on chance for its future destinies. Should it happen to be thrown into the dunghill, along with the excrementa with which it was voided—or should it be dropped amongst thick luxuriant herbage, or in the thickest grass of some rich pasture, where it will remain undisturbed, under the protection of the alvine deposite made at the time of its ejection, it will, in the course of three or four weeks, produce the perfect oestrus or gad fly, capable of reproducing its species. Happily, however, for the animal whose stomach it infests, but few of the hundreds of eggs that are deposited on a single horse arrive at this state of consummated existence. A variety of hazards await them through all the various stages and circumstances of their progress from this state to that of the fly. Such is their fecundity, when fully matured, that the slightest touch of warmth and moisture causes the little fœtus to burst through its prison; and should that warmth and moisture chance to proceed from a light shower, under the genial influence of the autumnal sun, instead of the lips or tongue of the animal, it falls to the ground and perishes. Should the little larva arrive safely in the horse's mouth, it has there to pass through the *lottery* of the teeth, and incur the hazards of mastication: and even should it *draw a prize*, and pass safely from this situation to the stomach, enveloped here in the huge mass of *ingesta*, there are great odds in favor of its passing on to the bowels, where, subjected to the action of the bile, it generally prefers a premature death

to a life of *gall* and *bitterness;* though you will now and then find a few hooked on to the duodenum, a little below the pilorus, or lower orifice of the stomach, that grow to maturity there in spite of *bad food* and *an impure atmosphere.*

After they arrive at the chrysalis state, numbers are lost for one that produces a fly. Dropped on some highway, in some naked pasture, or some pool of water, they are either crushed to death, picked up by birds, who keep a sharp look-out for them, or washed away; or they die for want of the protection of a nidus, indispensable to naked chrysales, and especially such as have been nurtured in the high temperature of the stomach of a warm blooded animal. The larvæ may generally be found adhering in groups to various parts of the inner coat of the stomach of the animal: but the greatest number are generally near its lower orifice, where the chyle is purest; their number varying from very few to (as some have affirmed) many hundreds. Here they hang in a pendulous manner, and live most probably on the chyle prepared by the stomach for the nutriment of the horse, until they arrive at mature age, which generally happens from the middle of May to the first of June; and they are passing from the horse from this time to the first of July, when such as chance to fall into suitable situations remain for some six or seven weeks in the chrysalis state, and then produce the fly again.

It has been stated that the larvæ of this insect most probably feed on the chyle in the stomach of the horse. A question, however, arises out of the vulgar opinion on the subject: do they ever prey on the *coats* of the stomach themselves? I confess that I have never had an opportunity of making any satisfactory investigation of the subject; but I incline to think not, because I am satisfied that the larvæ of this insect are not armed with any apparatus about their mouths, fitting them for making destruction of solid parts. The aperture through which they take their food being a simple longitudinal slit, between the two tentacula or hooks, by which they hold on to the villi of the inner coat of the stomach, brings us to the unavoidable conclusion that they must take their food by the most simple of all processes, and that they cannot take it *at all*, unless it be in a fluid or pulpy state. The idea, therefore—a very common one, in this part of the country at least—that the bots prey on the solid structure of the stomach itself, is most probably erroneous.

Another question then naturally arises: are horses killed ever by bots or grubs, as they are called? and if so, in what manner are they instrumental in producing the death of the animal? To doubt that horses are killed by bots would be, with most persons, almost as great a heresy as to disbelieve the ordinary doctrines of theology. Still, however, I think the fact admits of a doubt: at any event, I am sure the occurrence is not so frequent as it is generally thought to be, and that when it does happen, it is the result of gastric irritation, superinduced by the presence of *great numbers* of these larvæ, and not from their laying waste the coats of the stomach by preying on them, as is usually believed. The bodies of these larvæ seem to be composed of segments of bands, the majority of which are armed with a double row of short, stiff, horny bristles, of a reddish color, curved back towards the truncated end. The hooks by which they are attached to the stomach must of course communicate some irritation; and it is quite possible that the pendulous manner in which they hang from the villi of its inner coat may cause additional irritation, by means of the friction that must necessarily take place between these short hooked bristles and the delicate structure of the inner coat. The irritation, therefore, produced by the presence of a vast number of these larvæ may, for aught I know, and very probably sometimes does, produce inflammation and mortification of the stomach, and necessarily the death of the animal. But still I am satisfied, that where the numbers are not great, and the horse is healthy in other respects, their presence produces neither mischief nor inconvenience; as they are only occupying a nidus equally natural to them and the animal they infest.

S. *of Glencairn.*

Addenda.—I write this postscript for the purpose of calling the attention of gentlemen to a variety of the oestrus equi, or horse nit-fly, that has not been observed or treated on by any writer that I know of. This variety differs in several remarkable particulars from that described in the above communication. It is a full size smaller, and darker colored than that, and differs materially from it in its habits. The oestrus described is remarkable for depositing its eggs on no part of the horse that cannot readily be reached and pinched by his mouth. Indeed it seems instinctively to place them on parts most likely to be pinched or licked by the animal; and when they are laid elsewhere, it must be considered as an exception to the general rule, caused perhaps by the urgency of the stimulus of the egg on the parts containing it, demanding its instantaneous deposite in the very first situation that can be commanded. But the smaller fly, now under consideration, deposites its eggs no where, it is believed, but under the throat of the animal, and along the fissure leading from the throat in the direction towards the chin—a part that it is impossible he can get at with his mouth.

Its manner of making the deposite is also entirely different from that first described. It does not buzz about the horse as the other does, nor does it poise itself in the air for a moment, in the vicinity of the part on which it intends to attach its egg: but rising suddenly, either from the ground or from something on which it has alighted, it darts with great boldness and rapidity at the horse's throat, or the parts between that and the chin, causing him at first to throw up his head suddenly and shake it, and then to drop his ears in a semi-pendulous posture, and to hold his head remarkably still, as if listening for another attack of the fly; on the repetition of which he throws up his head still more violently, often raising his fore feet from the earth and bringing them near his chin, as if to frighten away the insect.

This variety of the oestrus is much more keenly and actively formed, and its movements are more rapid than those of that lately described. Still, however, if the rider will stop his horse, and practise a little patience when he perceives him attacked by one of these insects, he may, by watching acutely, discover the fly, and most probaby its retreat between the times of its attacks: for as soon as it has deposited an egg, it alights on some convenient object, or the ground, most probably to prepare another for deposite, when the attack is repeated, causing the horse again to act, not very

unlike he might be expected to do, if he were stung under the chin by a bee, which the writer thought was really the case when his attention was first invited to this subject. The egg of this is smaller, longer, and more oval-shaped, than that of the fly first spoken of; as may be readily seen by a comparison between such as may at any time be taken from the throat of a horse and those taken from the knee or other parts of the body.

Whether the larvæ differ in any thing else, than in being smaller, from those of the common oestrus, (for that first described is by far the most numerous and common variety,) must be determined by future and better opportunities for observation than have occurred to the writer of these hints. It may be remarked, however, that the greater sparcity of this smaller variety of the insect most probably results from the peculiarity of the situation in which it deposites its eggs; as the contingency of their getting into the horse's stomach is certainly much greater than that of the other, and must depend chiefly on accidental circumstances about the manger.

S. of G.

From the Farmer and Gardener.

THE HOLLOW HORN.

A writer in the "Farmer's Cabinet," who signs himself "A Montgomery County Farmer," gives the following as a remedy for the disease in cattle commonly called "hollow horn:"—

About 9 years since, my cattle were afflicted with the hollow horn, and it afflicted me very sorely, I assure you, as several of them died; but I *bored* away. One morning while engaged in this business, I was accosted by an intelligent farmer, recently from England—he was surprised at the operation. I told him that it was the only way of saving my cattle—that several had already died of the hollow horn, and the others assuredly would, unless *bored*. He absolutely laughed at me. I felt provoked, but was still willing to hear him, as I might get an original idea. He stated that the "hollow horn" did not exist in England. That it was not a disease of the horns, that hornless cattle had all the symptoms, &c. He advised me to desist boring. After much persuasion I did so; and he recommended me to give each of my cows a half a peck of potatoes twice a week, for three or four weeks in succession, and then occasionally, as circumstances might require—and by all means to keep my cattle well sheltered, and in good condition. I obeyed his directions—and the consequence is, that my cattle have not been troubled with the hollow horn since that time. I have, therefore, come to the conclusion, that cattle well housed in bad weather, and kept in good heart, at all seasons, and properly attended to, stand in no danger of hollow horn.

From the Wilmington (Del.) Journal.

A PRODUCTIVE PEACH FARM.

Mr. Jacob Ridgeway has a farm near Delaware city, in this country, on which he commenced planting a peach orchard in the year 1831. A neighbor of Mr. R. gave us, a few days since, the following account of the condition and product of the peach plantation during the present year. In the seven years which have elapsed since he commenced the plantation, Mr. Ridgeway has planted 140 acres—100 trees on the acre. The produce of the present year is estimated, by our informant, at 100 baskets of peaches per acre, or 14,000 baskets of peaches. The peaches, of which he presented us some specimens, are of the finest kind, large and of delicious flavor. Two schooners are constantly employed in transporting the fruit to the Philadelphia and New York markets; where we understand, it meets with ready sale at $3, $4, to $5 per basket. It is estimated that his peach crop will yield a profit, during the present year, of *twenty thousand dollars!* We add to this statement, that there is no part of our country which is more favorable to the production of this delicious fruit than the vicinity of Delaware city, and the whole district of country lying along the western shore of the Delaware, and extending from the Christiana down to Bombay Hook.

From (Loudon's) Gardener's Magazine.

ON THE FORCING OF EARLY CUCUMBERS.

By John Wighton, Gardener to Lord Stafford at Cossey Hall.

One great complaint among the growers of early cucumbers is, that the plants are often weak and yellow. This is occasioned by the beds being kept too warm, and too much covering being placed over them at night. The heat of the beds causes the plants to grow too fast for the small supply of light which they receive while the days are short; and which are rendered shorter still by the coverings being put on so early in the evenings, and left on so long in the mornings. I have always found that so much covering was rather injurious than beneficial. My practice is to cover up only in very cold weather, and then only with a single mat.

Crown glass should be used for very early forcing, and the surface should not be puttied. The glass in old lights is, like horn, almost impervious to the light.

In mixing up the soil for cucumbers, fresh dung should be used, and it should be allowed to rot in the soil. The common method of employing rotten manure is bad, because in that state the strength of the dung is already exhausted.

The old notion is still prevalent, that it is best to sow old seed, because plants raised from new grow too vigorously. There is no sense in such a prejudice: my own invariable practice is to choose new seed.

The usual method of putting three plants into one pot is also wrong. My plan is to put only one, and one plant only under a light. One good plant will fill the space of a light sooner than three set together.

It often happens that the plants are drawn up, as it is termed; having long stems. This has been attributed to the want of air, and to the plants being too far from the glass. But it arises, in reality, from there being too much heat in the bed below; for the plants never grow so, however far removed from the glass, and scantily supplied with air, if there be not too much under-heat.

Cossey, Feb. 10, 1837.

ON THE LANDS AND FARMING OF AMHERST.

To the Editor of the Farmers' Register.

Amherst County, October 9th, 1837.

Dear Sir—I herewith inclose you the amount of one year's subscription to the Register; and with the commencement of the relations which are hereafter to subsist between us as editor and subscriber, I shall venture to submit a few cursory remarks touching the quality of the soil and the state of agriculture in the region "I hail from."

There is, perhaps, no county of equal dimensions in the state which contained originally a greater proportion of rich land than the county of Amherst. In addition to the very large and fertile body of James river low-grounds, I may mention the fine bottoms bordering on Piney, Buffalo, and Pedlar rivers, as also those lying on Thrasher's creek. The general quality of the high land very nearly resembles the Albemarle lands so well known to the agricultural public. Indeed there is a continuous vein of land commencing in Orange, and running parallel with the eastern base of the Blue Ridge, through the counties of Albemarle, Nelson and Amherst, and which is known as the famous "red land district." The quality of this land will be best known by reference to those who have had ample opportunities of testing its merits, and the estimate placed upon it, when improved, will be the best evidence of its value. To great fertility in its virgin state—and I believe it is not surpassed by any land in Virginia—it superadds the valuable property of durability. But it is its adaptability to improvement which in my estimation constitutes its greatest value. It seems somehow to contain inherent in its composition, the materials admirably adapted to its resuscitation when worn out and exhausted. I am aware that were a stranger to see a great portion of this land in its present unimproved and dilapidated condition, he would naturally be led to the conclusion that the encomiums I have pronounced upon it were exaggerated; and, indeed, it is not to be concealed that the present appearance of a large moiety of it is not prepossessing. The original owners of this soil, (peace to their ashes,) and I regret that it is the case with too many of their descendants, appear to have been either wofully ignorant of the value of land, or reckless as to the consequences of their wretched and land-killing mode of cultivation. The culture of tobacco has been generally charged with all the mischief, but, in my opinion, not correctly. Let us do justice to the great staple of the "Old Dominion;" and if, as I confess, it is fairly entitled to bear its just and equitable proportion of the blame, I must, nevertheless, protest against its being held responsible for *all*. Its cultivation on a large scale, I admit, is incompatible with a very high degree of improvement; but I deny that, when *prudently* cultivated, it is incompatible with a degree of improvement fully equal to that which can be attained when wheat is made the exclusive market crop. The truth is, agriculturists have of late been too hasty and too universal in their condemnation of the growers of tobacco. It is the *excess* of the growth of the article, and not any exhausting quality in the article itself which deserves condemnation. A highly manured tobacco lot is perhaps the very best preparation for wheat, as it doubtless is for every species of grass. But it appears to me that our best policy is to cultivate *a mixed crop*. The farmer *must* have money, and no other than a mixed crop can regularly insure this great desideratum. Do not understand me as opposing a liberal system of improvement; on the contrary I urge its indispensable importance. But this I would effect, not so much by the total exclusion of the tobacco crop, as by the improved mode of cultivation—deep ploughing—the raising and judicious application of manures—clover and plaster, together with other artificial grasses, (both as a vast improvement to the soil, as a great source of profit, and also as an important addition to our comfort,)—the four-shift system, &c.

Many enterprising and intelligent gentlemen in this county are making praise-worthy, and, in many instances, eminently successful efforts to improve the system of farming among us. We have a few specimens of the short-horned Durham, and also of the Devon cattle—also the Berkshire, Surrey and Mackey breeds of hogs, besides several varieties of improved sheep. I think the spirit of improvement is becoming general in our community, as well as elsewhere through the state; and the time, I trust, is not far distant, when Virginia, redeemed, regenerated, and disenthralled, shall reoccupy her proud position in the front ranks of this grand confederacy.

P * * * * * * *.

From the Medico-Chirurgical Review.

ON THE INSALUBRITY OF THE AIR OF MARSHES IN COMMUNICATION WITH THE SEA.

*By M. Georgini, of Lucca.**

The deleterious influence of marshes on the health of those who live in their neighborhood, is but too well known; and is a subject which well merits the attention both of the physician and the legislator. It is also well known, though hitherto not clearly accounted for, that all marshes, even when close together, and consequently under the same climatorial circumstances, are not equally inimical to human health and human life. Of this fact Italy offers a striking example. In certain parts of that interesting country, the vicinity of marshes does not diminish the fertility or the population; while, in other localities, it exercises the most baneful powers. It was long ago conjectured, but not proved, that admixture of sea-water with that of marshes, increased the malignity of the exhalations issuing thence, and the problem would now appear to be solved by events which have taken place in Italy.

Between the Ligurian Appennines and the Mediterranean sea, lies a marshy tract of coast, about twelve Italian miles in length, and varying from two to four in breadth, traversed by several mountain streams or rather torrents, which are discharged into the ocean, or into the morasses bordering thereon. The marshy plain in question may be considered as an alluvion deposited by the rivers Arno and Serchio, and is bounded on the sea-line by a sort of embankment, only a few feet above the level of the ocean. The waters collected by rains, &c. are discharged from three basins into the sea by natural or artificial canals. The

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* Archives Génerales.

level of the stagnant waters is below high-water mark, and somewhat above the ocean during ebb tide. In consequence of this circumstance, and before any hydraulic works were constructed, the flood tide changed the currents of the different exutories, and caused them to run backwards into the morasses, mixed, of course, with a proportion of sea-water. While this was the state of things, the population of this wretched district was very scanty; and Viareggio, now a large town, consisted of only a few huts. The natives, who were few in number, were constant victims to diseases of the liver and spleen—the children were sickly—and old men were no where to be seen. The unhealthiness of the place had, in fact, arisen to such a height, that the culture of the olive tree, with which this fertile tract abounded, was almost entirely abandoned to strangers, who, of course, fell annual victims to the malaria of the marshes. Various attempts were made to remedy the evil; and at length, about the year 1741, a complete stop was put to it, by the construction of valvular gates, which permitted the efflux of the waters from the marshes, but prevented any reflux of water from the ocean. The effect was instantaneous and surprising. The insalubrity disappeared immediately these flood-gates were completed, and only partially re-appeared when they were out of order, and permitted the admixture of salt and fresh water in the marshes. Viareggio is now so salubrious as to be much frequented by the neighboring wealthy inhabitants, as a place for sea-bathing and enjoying the delightful sea-breezes in the heat of summer. The population has rapidly increased, as a matter of course, since the happy change in the climate, and Viareggio, which, in 1733, contained only 330 inhabitants, now shows a population of between four and five thousand.

That this fortunate change was owing to the means above-mentioned, we are not disposed to deny; nor do we doubt that the admixture of salt and marshy water may have a deleterious influence in the production of malaria; but it is also unquestionable that the most deleterious exhalations issue from morasses which have no communication whatever with the sea.

From the Papers of the Penn. Horticultural Society.

BLIGHT IN PEAR TREES.

If the blight in Pennsylvania is the same as that which prevailed in Connecticut, between the years 1808 and 1823, (where I then resided as an agriculturist,) or the same as that which has appeared in this section of country, since 1830, the cause of the disease is a small, slimy, disgusting moth, or worm, which will be found enveloped in a closely woven web, underneath a leaf, usually on the topmost branch of the tree. Pluck off the leaf and destroy the moth, and the tree is preserved; or if more than one of the leaves are turned *brown*, (the first indication of the presence of the moth and its deleterious effects,) you may be sure that the branch is *tainted*, and must, therefore, to eradicate the *taint* or *poison*, cut off the branch until the pure white of the wood, and the clear green of the inner coating of the bark, appear. The moth does not, apparently, feed on the leaf, for at no season of the year, is it perforated; but its effects appear to be of a deadly poisonous nature. The leaf, underneath which it is sheltered, first turns brown, and the poison appears to be communicated through its fibres to the stem to which it is attached, and then conveyed down the stem between the inner bark and wood, turning the leaves of a brown color, and the stem of a blackish hue, until it reaches the main body of the tree, when death ensues. Cutting off the stem *even below* where it appears to be dead, a dark ring between the inner bark and the wood will be perceived. *All* this discoloration *must* be cut away, or the poison will still operate, and the taint go on. It is like gangrene in animal life.

While in Connecticut, I had a fine thriving young orchard of fifty-three pear trees and twenty three varieties. I was very choice of them, and by attention in plucking off the discolored leaves, and topping off the diseased branches, I preserved them *all* during the most fatal season, (and indeed during the whole time I was on my farm,) while my friends, during that season, and before I was aware of it, had lost from one-third to two-thirds of their trees. I communicated the result of my observation and experience to an agricultural society in that state, and I am strongly under the impression, that by its direction, that, communication was given to the public through the papers of the day.

The trees should be watched (according to the season,) from about the 10th of May to near the close of June, and on the appearance of a leaf turning brown, it should be immediately plucked off; and if the branch is diseased, it should be as speedily topped off.

I have not satisfied myself what insect deposites the egg which produces the moth, although I conjectured that an active, nimble winged bug, with a reddish head and about the size and shape of a winged pismire, might be the depositor, as on the trunk of every tree where I found the moth, I discovered this insect.

Lest I should tire you, I will close, merely adding that if you should hereafter wish for a more detailed account of the discovery of the moth and its fatal effects, (which were purely accidental,) I will freely give it, or answer any queries which you may be disposed to put to me.

I am, sir, very respectfully, your obedient servant,

HEZEKIAH BELDEN.

Lewisburg, Va. April 17, 1837.

REPUBLICATION OF JOHNSTONE'S ACCOUNT OF ELKINGTON'S SYSTEM OF DRAINING, &c. AND AITON'S ESSAY ON PEAT OR MOSS SOILS.

Having obtained from England the late edition of Johnstone's 'Theory and Practice of Draining and Embanking,' we shall commence its republication in the next number of the Farmer's Register; and (as we have a strong aversion to cutting up articles into separate fragments "to be continued,") we shall bring it to its end as fast as the engravings of the plans and figures can be procured. Even should this part of the work be badly and imperfectly executed, (as is always to be feared, under existing circumstances,) the cost of engraving alone will amount to about $200. We shall cheerfully submit to this additional tax, for

the purpose of presenting to our readers the best treatise of draining known, in its latest and most perfect form, and of which very few copies even of the early and less perfect editions have ever reached this side of the Atlantic. The new English edition is in quarto, and cost $6 in England, and would scarcely be furnished by booksellers here, importing at their own risk, at much less than $10. We shall republish the whole, in about 90 pages of the Farmers' Register, and at a cost to our subscribers of about 65 cents. A few hundred copies will be also printed separately, for gratuitous distribution and for sale—but without any expectation being entertained that this separate publication will yield any direct profit—as such a result would be different from any heretofore obtained by us, from any such separate publication.

The first edition of this treatise consisted principally of the account of Elkington's system of draining, which was referred to in Washington's correspondence with Sinclair, and in various other parts of the Farmers' Register. The present edition presents the same in a much improved form, with the addition of much other kindred and valuable matter. The first publication was drawn up by Johnstone by order of the British Board of Agriculture; and by the recommendation of that body, a parliamentary grant of £1000 sterling was made to Elkington, on account of his valuable discovery.

As a suitable introduction to a treatise on draining which has reference principally to peat, moss, or bog soils, we shall first give Aiton's essay on this very peculiar (and in this country very rare) kind of soil. The information furnished by this piece will be highly interesting to all who study agriculture as a general science, and not merely as a body of recipes, applicable only in local and particular practices; and even if there was not a peat soil in this and the more southern parts of the United States, (as we had believed until our recent examination of the Dismal Swamp,) there is much in regard to the nature and phenomena of peat soils, from which a thinking agriculturist may profitably make deductions, that will apply to other soils, and to their fitness or unfitness for improvement. Aiton's Essay on this subject attracted our attention and interest many years ago, and it would, long before this time, have been transferred to the pages of the Farmer's Register, but for the consideration of the very prevalent (and often groundless) objection of most readers to the discussion of subjects which are not applicable in practice. Such objections might have been formerly made, in our view of the subject, as then entertained—but not now, when it is known that even as far south as Virginia, there are many thousands of acres of peat soil, and probably still more in North Carolina, among the vast swamps, for the draining of which the legislature of that state has lately instituted measures, and made liberal appropriations. The proper and full knowledge of peat soils, and of their chemical constitution, may possibly save to North Carolina the loss of half of the $200,000 appropriated by law for this noble object.

The foregoing remarks were in type for the last sheet of the November number, but were excluded to make way for other communications.

For the purpose of laying before our readers the two works above named as soon, and each as much in connexion, as possible, and at the same time not to fall in arrear as to communications of correspondents, and newer selected articles of immediate interest, the two next numbers will be issued in the course of one month.

ED. FAR. REG.

From the Farmer's Magazine.

ON THE ORIGIN, QUALITIES, AND USES OF MOSS [OR PEAT] EARTH.

By William Aiton, Writer, Strathaven.

No. I.

Strathaven, 20th June, 1811.

Sir—The celebrity which your Magazine has so justly acquired, and the great extent of its circulation, renders it the most proper channel through which I can attempt to direct the views of my countrymen to a branch of agriculture, which, I humbly think, has not yet met with attention any way suitable to its vast importance—I mean the reclaiming of waste land, particularly that part of it which is covered with *moss* earth. If we consider the prodigious extent of surface now covered with moss-earth in Scotland, and the injurious effects which it has upon the climate, the subject will not appear unworthy of serious consideration.

Unless an actual survey were made, it is not possible to speak with any sort of accuracy as to the extent either of that species of soil, or of other descriptions of *waste* land in Scotland. The Board of Agriculture, on the authority of county surveys, and other information considered to be correct, stated the waste land in North Britain, some years ago, at upwards of *fourteen millions of acres*. But from the investigations and surveys which I have made on that subject, to enable me to draw up a rough draught of the chapter on waste lands, in the General Report to be laid by the Board, before the King and both Houses Parliament, I am inclined to estimate the waste land in Scotland at upwards of *twenty millions of acres;* and that a very large proportion of that species of land is covered more or less with moss-earth. The recovery of even a small part of these extensive wastes must, therefore be a matter of great importance, not only to the proprietors and occupiers of such land, but also to the public.

The injurious effects which such vastly extended ranges of uncultivated moss-earth have upon the atmosphere, by the chilling damps that they send forth, which lower its temperature, and benumb vegetation in the neighboring fields, render the subject deserving of notice, and ought to stimulate proprietors to make every exertion to remove these injurious effect by cultivation.

Leaving the other species of waste land to be noticed in some future communication, I shall offer a few remarks, 1. On the origin, 2. On the qualities, 3. On the uses of moss-earth, and, 4. Mention a few instances of successful moss-culture in different parts of Scotland and England.

1. *On the origin and classification of Moss.*

This subject having been in some measure explained, in the answers written by me to some

queries anent that substance, which appeared in the XXXVIIIth number, and which you had the goodness to insert in the XLIId number of your Magazine; and the subject being more connected with natural history than agriculture, I shall not at this time enlarge on it. Let it suffice to say, that moss is neither an original earth, a submarine production, a collection of antediluvian herbage brought together by Noah's flood, nor a growing plant *sui generis;* but that it is an immense collection of vegetable matter, the remains of many successive crops of the aquatic plants which have grown on the surface, year after year, in places where too much moisture for the growth of more valuable herbage was detained, and where the temperature was low. Wherever land in the frigid or temperate zones is laid under much moisture, all the rich grasses disappear, and marsh or aquatic plants form the chief or only herbage. These do not, like the more valuable plants, yield speedily to putrefaction; but, from the acids, tannin, extract, or other antiseptic qualities which they possess, hold out against all the powers of this destroyer of plants, and preserve, for many centuries, something of their organic texture; or, if that be destroyed, at least some part of their substance remains in a mucous state, and adds, one crop after another, to the depth of the moss-earth.

The depth of the moss stratum will be always found to be in proportion to the extent of the stagnation of moisture over the surface. Where the ground has considerable declivity, or the subsoil is open and permeable, the plants that form moss-earth, are but partially introduced. Along with the heather (*erica vulgaris et tetralix*), the yellow fogs (*hypnum squarrosum, filicinum et rutabulum*), goldilock (*polytrichon commune*), stool-bent (*juncus squarrosus*), whitebent (*nardus stricta*), tormentilla, &c. which contribute to the formation of moss-earth, several of the sedge grasses, (*carices*), and even some of the richer grasses, as bents (*agrostes*), fescue (*festuca*). hose grass (*holcus lanatus*), &c. grow in a dwarfish state; and the accumulation of moss-earth is so slow, that, even in places neglected as to culture since the commencement of vegetation, moss-earth has only attained to a few inches in thickness, and is not fit for fuel, but is merely a black, friable mould, formed over the original soil. This species of moss-earth I shall have occasion to notice, in course, under the denomination of moor-ground, or *hill moss.*

Where the surface has less declivity, and the subsoil of a clayey nature, through which the moisture does not so readily percolate, the stool-bent (*juncus squarrosus*), turfy club-rush (*scirpus cæspitosus*), goldilock (*polytrichon commune*), sedge grasses (*carices*), blue mountain or blowing grass (*melica cærulea*), tormentilla, yellow fogs (*hypna*), &c. are the most prevalent plants; and there, moss earth will be found to have accumulated from one to three feet in thickness; to be more firm and solid than any other species of moss; and to make the best fuel. This, in the western parts of Scotland, is usually denominated *bent-moss*; and I shall give it no other name.

But where, from the surface being still more level, and the subsoil close and impenerable to water, and where, by the rising of springs, overthrow of trees, or other obstructions, a still larger quantity of moisture has been long detained, and continues to be constantly kept on the surface, every thing in the shape of grass or green herbage is banished; and the following plants grow up, viz:

Marsh fog,	Sphagnum palustre,
Goldilock,	Polytrichon commune,
Drab-colored fog,	Bryum hypnoides,
Cotton heads,	Eriophorum polystachion, vaginatum et angustifolium,
Turfy club-rush,	Scripus cæspitosus,
Yellow fogs,	Hypnum rutabulum et filicinum,
Heather,	Erica vulgaris et tetralix,

—and some smaller plants.

In such situations, moss-earth will be found from two or three to fifty feet in thickness, and where the supply of moisture on the surface is still more abundant, the depth of the stratum is fast increasing.

Moss of this description is always loose, open, light, and of a drab color, the vegetable fibre being still perceptible; and, though it readily burns, makes but a weak fire. This, in all parts of Scotland, is denominated *flow-moss*.

These three descriptions seem to comprehend all the arrangement, or classifications of moss-earth that are necessary, or can be of the least utility to the cultivator. All of them are abundantly perceptible; and, indeed there is no other description of moss-earth that is not included in one or other of them. *Hill-moss* is dry and firm, with a stratum of black earth of only a few inches deep; and, except the heaths, the plants it produces are stunted and dwarfish. *Bent-moss* is distinguished from all others by its solidity and firmness, and the rough green herbage, resembling coarse grasses, with which it is uniformly covered. *Flow-moss* is in every respect different from either. It is nearly void of any thing resembling grass or green herbage: heather and fogs are the chief plants. It is always wet, soft, frequently uneven on the surface and sometimes abounds with hags, or natural gullies, of considerable depth.

None of these in the least resemble each other; nothing that I know is to be found in nature, which the simplest rustic could mistake for any one of them; each requiring a different mode of treatment, when improved for pasture or cropping.

By some learned doctors, who have written on this subject, moss-earth has been divided and subdivided into many different species; distinguished from each other by their color, density, inflammability, acidity, admixtures, supposed chemical qualities, &c. &c. To these they invent a nomenclature, extremely perplexing, in which no two of them agree; and they tell us, "that it is clear to a demonstration, that these *different genera* must require *different treatment*, either as a soil or manure;" that "it were equally absurd to cultivate all these different kinds of moss in the same way, as to apply *one plaster to all sores.*" In fact, it would seem, they think nobody can cultivate moss with success, or with certainty, until they have ascertained not only the plants on its surface; the degree of its solidity; its color; how far the organic texture of the plants have been reduced; how many admixtures may have got into it; whether it has been transported by water, or by what other means it may have been deposited; and un-

til they have called to their aid some well-paced chemist, with the necessary apparatus, and made a complete analysis of the moss, to see if it is fit for fuel, manure, or a cultivated soil; and to say whether, from its nature and qualities, it must be manured with lime, dung, or what else. And as all these diversities of moss, according to their arrangements, may frequently be found, not only in the same field, but generally within a few yards of each other—as, that of a dark and light color—a dense or fibrous texture—this or that admixture or diversity of chemical qualities may be found above, below, and near to each other, in the same stratum; the whole moss would fall to be dug up, and a new analysis made, wherever the color, solidity, &c. were found to vary, before the humble cultivator could with safety proceed to labor or crop any part of it. When it is considered, however, that none, even of these learned doctors themselves, have yet been able to make a proper analysis of any moss; that such operations are tedious, laborious, and very expensive; and that, in the still imperfect state of science, the results cannot always be depended upon; these distinctions, which, in so far as regards the cultivation of moss seem to be fanciful, unnecessary and unintelligible, instead of promoting, cannot fail greatly to retard, the improvement of that species of soil—intimidate and bewilder the cultivator—and deter him from so much as attempting to reclaim any part of these unsightly wastes. Like the road which some have pointed out to heaven, these learned gentleman mark off so many turnings and windings, stiles and traps, the least deviation from any one of which will be forever fatal, that the farmer, when he has read their learned theories, will abandon moss culture as a foolish and dangerous project.

An ingenious, intelligent, and highly respectable author (Dr. Rennie), has in p. 617 of his Essays on Moss, objected to the arrangement made in my publications, and which is the same as here stated, as deficient and indefinite; and after reducing the plants I had mentioned to the form of a table, he adds, "according to this table, hill moss contains all the plants which grow on the other two kinds, except three. The first four plants are common to the first and third species; the next eight are common to the first and second. To suppose, therefore, that this *small* difference should constitute a ground of arrangement, either intelligible to the natural historian, or useful to the cultivator, appears doubtful.

But if the doctor had duly attended to what I stated on that subject, he would have found, that, though I gave a list of the plants which each of these sorts of moss produces, I did not classify moss according to the vegetables which grow on the surface. I say, in page 11th of the pamphlet he quotes, "the only rational and useful classification of moss-earth, seems to be that which arises from the aspect it presents to the cultivator." The diversity of the plants that grow on hill-bent, or flow-moss, are not so great, as Dr. Rennie seems to have expected. Heather, the most bulky of all the moss plants, is found on hill and flow moss, but scarcely ever met with on bent-moss. The yellow fogs (*hypna*) abound on all sorts of moss, and every other soil; the goldilock grows on all kinds of moss, and upon every kind of moorish land in all parts of Scotland—on the dry sands at the sea-side, the tops of stone-dikes, and the wettest sanks in flow-moss. In dry places, however, it is but short and dwarfish; in moss gutters, it grows long and luxuriant. The sphagnum palustre, bryum hypnoides, and cotton-heads, never grow but on very damp places, either on flow-mosses, or where that species of moss is beginning to be formed.

But whatever similarity there be in the plants that grow on their surface, the *general aspect* of these three species of moss are so very different from each other, that no man who can point out one species of soil from another, could have the least difficulty in distinguishing them. A piece of hard dry, heathy ground, on the skirts of a hill, having a firm open bottom, with heath and stunted dwarfish herbage, and only a few inches of black earthy mould, has no resemblance to solid firm moss, two or three feet in depth, forming the best fuel, and covered with coarse green herbage, eaten by all sorts of cattle; and still less resemblance to a deep soft flow-moss, which does not support the foot of a man, scarcely of a dog—on which no green herbage appears, and which is intersected with deep flags. There is no other species of moss that bears the least resemblance to any of them: and though they are found lying in alternate patches, and like the other productions of nature, do not change abruptly, but gradually, and almost imperceptibly; yet they are all so different in their general appearance, that when they are only named, every laborer will point them out. It is not necessary to bring men conversant in science, with re-agents, or chemical apparatus, to point out the distinctions; for they are so obvious, that he who runs may read.

I am not, however, to be understood as despising science. On the contrary, I have taken every opportunity in my power, to show the intimate connexion that subsists between chemistry, natural history, and agriculture; and to express my wishes, that something of the rudimental parts of these sciences were taught in all our churches and parochial schools. I have lamented, that the qualities of moss-earth have not been better ascertained, by men of science. The researches of Lord Meadowbank, who is an adept in science and in agriculture, has led to the most useful results, in converting moss into manure; and I trust still greater discoveries will be made. But I expect no good from a divided and subdivided classification, and greatly extended nomenclature of moss. This can only serve to perplex the cultivator—deter him from proceeding to reclaim his mosses, and mar the usefulness of publications that otherwise might do much good.

II. *On the qualities of moss.*

It would certainly be desirable to scientific men, and might lead to some useful results in agriculture, if a more complete knowledge were attained of the qualities of moss. The natural historian would no doubt be profited by further knowledge of the essential qualities of substances, of which the plants, which form moss-earth, are composed; how these are collected, and united into plants by vegetable organization; what are the chemical principles to be found in these plants, either when in the vigor of their growth, or when partial or more complete putrefaction has taken place. Such information, would no doubt lead to useful results in

natural history, in chemistry, and in agriculture. It would probably discover more perfect and easy modes of overcoming the antiseptic qualities of moss-earth, and thereby render it still more efficient as manure; and perhaps show what substances operate most powerfully as manure to a moss soil.

Till such information can be procured, we must content ourselves with that portion of knowledge to which we have already attained, and to which we are daily adding, by well conducted experiments. To retail the partial experiments, or attempts at analysis of that substance, which have been already laid before the public, and in the technical form in which they are generally given, could be of no use to the great body of your readers, or that valuable class of men, the practical farmers, to whom we are to look for the improvement of our extensive wastes. All that I shall attempt, and indeed all that in my opinion can be useful to the cultivators of that species of soil, is merely to name the qualities that are most perceptible to an agriculturist; as, *inflammability—acidity—insolubility*, or *antiseptic quality—tenacity, &c.*

1. *Inflammabilty*, or the quality of catching and being consumed by fire, which is found in all sorts of completely formed moss-earth, no doubt proceeds from one or other of these substances, which chemists term simple inflammables; as carbon, sulphur and phosphorus, with the binary compounds into which they enter.

To which of these the imflammability of moss-earth is to be chiefly imputed, has not probably been well ascertained; and as the fact, of its being highly inflammable, is well known to all ranks; and as further inquiries regarding that quality are no way connected with its improvement as a cultivated soil, it can serve no end to dwell on it here, were I even better qualified than I am to do justice to the subject.

The plants which contribute to the formation of moss-earth possess, when growing, no more inflammability than recent vegetables of any other description. But, while the inflammability of other vegetables is diminished in proportion as putrefaction and decomposition advance, the plants which compose moss-earth, kept together in a mass, become more inflammable, in proportion as they have come under putrefaction, and a dissolution of the organic texture. How nature conducts these processes, so different in the putrefaction of different kinds of plants, has not, I believe, been yet ascertained, though the fact cannot be doubted. As there seems to be no material difference in the degree of inflammability in all kinds of plants, at the time they attain full growth, either the moss plants must, by some process in nature different from those of other species, retain all their inflammability, when under putrefaction, and only yield up the ingredients of a different nature; while other plants first give up with that quality, and retain those that are uninflammable; or the former must attract and acquire inflammability, as putrefaction advances, while the latter have no such powers. Dr. Rennie thinks the inflammability of moss arises from its *retaining*, while under decomposition, a large portion of *hydrogen*. But Dr. Jamieson says, that many facts lead him to conclude, that the common peat is vegetable matter, *deprived* of a considerable portion of its hydrogen. Moss earth, however, soon loses much of its inflammability when it is dug up, and long exposed, separately from the general mass, to alternate rains, droughts, frosts, thaws, &c.; but, if dried when recently dug up, and kept dry, it will bear to be exposed to the air for centuries, without losing any part of its inflammability.

I cannot concur in the opinion of Dr. Rennie, p. 507 of his 'Essay,' that "moss is more inflammable in proportion to the moisture it contains.' The reverse seems to me to be uniformly the case. The more level that moss is, and the more moisture it is laid under, the less valuable will it be as pasture, as a cultivated soil, as manure to other land, or as fuel. If the water is raised two or three feet over the surface, none of the plants that have been named above can grow. Lake plants, as the *Potamogeton natans*, *Nymphæa lutea et alba*, *Arundo phragmites*, *Scripus lacustris*, *Alisma plantago*, *Pedicularis palustris*, *&c.* are the ordinary plants that grow, till they accumulate in, and fill up the lake to the surface. These form, not properly moss, but a sort of lake turf, scarcely inflammable or fit for fuel. If the surface is not covered with water, but kept extremely wet, the *Sphagnum palustre*, *Polytrichon commune*, and *Bryum hypnoides*, will be the chief herbage. These form a sort of light, fibrous, drab-colored moss, that when dry, will catch fire and burn; but which is the least inflammable of all sorts of peat, and scarcely deserves the name of fuel. From that state to the driest moss that is to be met with, the degree of inflammability is gradually increased. Hill moss is too thin for being cut up for peat; but bent moss, which has always as much declivity as prevents water stagnating on the surface, forms the best of all peats. One square foot of the driest bent moss, will go farther as fuel, than ten foot of the drab-colored peat composed of sphagnum, and which has been formed in a stank of water. In a word, moss-earth is inflammable, and valuable as fuel, just in proportion as it has been relieved of stagnant water.

The trees that are found buried in moss, are not inflammable in proportion to the progress that putrefaction has made upon them, as some have asserted, but the reverse. The rotten birch trees, and those parts of the oaks that are most completely dissolved, will kindle and burn; but they do not make nearly so good fuel as the firs, and the more solid parts of the oaks, that have not yielded so much to putrefaction.

2. *Acidity* in moss is evidenced by its smell when newly dug; by the pungent acrid odor of peat smoke; the smell of clothes, or any thing that has remained long in a house where peats are used as fuel, the pain felt in their eyes by people going among the smoke of peats, who are not accustomed to breathe in such an atmosphere. Some have termed it the *gallic* acid, some the *suberic;* and others have mentioned the *carbonic*, the *acetic*, and the *sulphuric acids*, as abounding in moss-earth, &c. But, as Dr. Rennie justly observes though the acidity of moss is abundantly obvious, the particular acid found in it has not yet been sufficiently ascertained; and probably different acids may be traced in different mosses.

All that seems necessary for the husbandman to know, is that moss contains a considerable portion of some acid or other. Whichever of the kinds it may be, lime will neutralize it, and convert it into manure; and the destruction of the acid by

il me will accelerate the decomposition of the vegetable matter of which the whole mass of moss-earth is composed; and, as putrefaction advances, the food of plants will be prepared, and the moss will be gradually formed into a black mould. Lime is the best re-agent that the farmer can apply; and a shovel to put it on, with a spade to dig up the moss, are all the apparatus he can as yet use to advantage.

3. *Insolubility*, or an *antiseptic quality*, forms the distinguishing peculiarity of moss. All other plants, whenever they cease to grow, are liable to be dissolved by putrefaction. It is appointed for all vegetables, as well as animals, to die, and, after death, to be subjected to decomposition. That terrible power begins where vegetation terminates; and steadily pursues its course of destruction, till it completely reduces the beautiful works of vegetable organization, sets the whole substances of which plants were composed at liberty, and either restores them to the elements from which they had been collected by vegetable organization, or gives them an opportunity to enter into new compounds. While vegetation is rearing and perfecting a new crop of plants, putrefaction is reducing and separating the component parts of that which preceded it; and as growing plants are fed upon the remains of former crops, when reduced by putrefaction, that awful power may be considered as the feeder and supporter of plants while they remain in life, and their destroyer whenever they die.

The plants which grow upon, and contribute to the formation of moss-earth, are the only ones in the whole vegetable kingdom that oppose any thing like a successful resistance to the all-subduing powers of putrefaction. Their resistance, however, does not prevent the destroyer from advancing so far, as in all cases to disfigure the plants, and, in many cases, to nearly annihilate their organic texture; but its powers are not adequate to the complete reduction of that tribe of plants. A considerable portion of the organic texture of some of the plants, and a sort of mucus, which is formed of others, baffles the powers of putrefaction; and one crop of these accumulating over another, the moss stratum has risen to the height we now see. The plants that grow in the greatest quantity of moisture, are those that present the most powerful resistance to putrefaction.

The insoluble antiseptic qualities of moss are so powerful, that they will prevent putrefaction from making the least progress on wood, metals, clothes, leather, or even on animal matter, when buried in moss. The trees found in moss are often much rotted, especially in the upper side: but this must have happened before they were covered over by the moss. The clothes on dead bodies buried in moss for more than a century, have been found as sound and free from rottenness, as if they had only remained there for one month. I have in my custody, a shoe evidently of Roman manufacture, and a species of cloth formed of hair, both found under moss in this parish, which though they must have remained there for many centuries, are as free from corruption as those now in the shops for sale. Many humam bodies have been dug up from under moss, in various parts of Britain and Ireland, after remaining a century, and some of them several centuries in the moss; all of which have been found as entire and free from corruption as when they were buried.

So far as I know, it has not yet been ascertained what are the particular ingredients of these plants, or in the moss-earth formed from them, that withstand the powers of putrefaction. Dr. Walker thinks it cannot proceed from the mineral or vegetable acids; but Dr. Rennie mentions the carbonic, the gallic, and the sulphuric acids, and Dr. Jamieson, the suberic acid, among the chief causes of the antiseptic quality of moss earth.

Be this as it may, I am humbly of opinion that *tannin*, though not mentioned by either of them, contributes powerfully towards the resistance which moss presents to the dissolving powers of putrefaction. Many of the plants which grow upon moss, and contribute to its formation, contain a large portion of *tan*. Tormentilla, which is found growing in all sorts of moss, contains more *tan* than any other plant, and is the most powerful astringent known in the vegetable kingdom. Probably resin, gum extract, and the bitter principle, will also be found in some of these plants and contribute to their antiseptic qualities.

As moss is wholly composed of vegetable matter, and, of course would form the best of manure if it were or could be rendered soluble, a discovery of the means, by which its antiseptic and insoluble qualities could be removed, and the moss rendered as septic and soluble as other vegetable matter, would be of greater importance than any discovery, either in agriculture, or any other science, for a century past. It would, in fact, enable the farmer to extend the volume of his dunghill at pleasure, and add several millions of acres to the range of cultivated and productive soil.

4. *The tenacity* of moss, in the natural mass in which it is found, and when it has been dried into peat, has been noticed by all who have written on the the subject. While moss remains unbroken, it is so close and adhesive, that, if left one or two inches in thickness, and duly supported, it will hold water like a dish; and when good black, well decayed moss, is cut into peat, and dried, before its tenacity is loosened by frost, or much rain, it becomes so hard and firm, that it is not afterwards so easily formed into a soil, or melted down by the weather. But this quality in moss seems to me to have been much overrated.

Degner, a Dutch philosopher, author of the opinion afterwards retailed by Dr. Anderson, viz: that moss was a growing plant *sui generis*, asserts, that when moss is dried, it becomes a hard tenacious substance, insoluble in water; and that his countrymen sometimes lay the foundations of their houses on peats; and when the buildings have decayed through age, the peats remain sound. Dr. Anderson, who implicitly follows Degner, repeats the same story; and Dr. Rennie, who has devoted a section to that subject, asserts, that "after peat is thoroughly dried, it is one of the most insoluble substances, and the least liable to change or dissolution." He then adds, under a quotation mark, but does not say from what authority, that "a piece of dried peat was put into the boiler of a steam-engine, for three months; yet, though exposed to a heat greater than boiling water, it remained unchanged." The surface of the peat was covered with something like the powder of iron; but "the centre, and all but the surface, was unchanged." This tenacity, the Doctor thinks proceeds from the bituminous qualities of the moss; and he says the adhesion of

the peat can be destroyed by removal of the bitumen, and again restored by the "application of liquid bitumen, or even by immersing it in a quantity of water squeezed out of another piece of moss."

I have never seen peats that had remained for ages as the foundation of a house, nor that had been three months in a boiler; but I have seen peats of as good quality as the best in Holland, or any other place, when exposed to the vicissitudes of the weather for three or four years, lose their tenacity, becomes loose and friable, and moulder into earth, being as destitute of inflammability as so much old farm-yard dung. The ends of those that are in a stack exposed to the weather for a year or two, become loose in their texture, and lose the greatest part of their inflammability. Vegetables will soon begin to grow in them; and the whole stack would crumble down to earth, in a shorter time than a well built house in Holland could be supposed to decay of age. The ends of the peats that are placed next to the ground in the stack, are always damp, and their adhesion loosened; and peats are always so, when placed for a few months in any damp place. When any, even of the driest and the best peats that ever were cut, are left on the spread-field over year, they are not worth taking home for fuel next season; and in two or three years more they have lost all form of peats and adhesiou, and are crumbled into earth, nearly destititute of inflammability. I never tried the cementing powers of any other liquid bitumen; but the water squeezed out out of any other species of moss had no effect with me in restoring the tenacity of weather-beaten peat. I will venture to assert, that all the juices that can be squeezed out of an acre of moss-earth, will not cement and render adhesive one peat of an ordinary size, made up of the remains of those that had remained two years exposed to the weather, or of the crumbs of peats on the peat-stack-stead. If these were again reduced to pulpy mucus,or as soft and void of granulated matter, (a thing by no means easy to be done with good peat), it might be baked into peat, which would be somewhat adhesive when dry; but I do not suppose that the water squeezed out of moss would have any effects in that operation, more than that taken from a spring or river.

Degner and Dr. Anderson have endeavored to support their favorite theory, by an argument deduced from the circumstance, that no worms, nor animalcula, are found in solid unbroken moss, more than a foot or eighteen inches below the surface. Dr. Rennie, taking their story for his text, has displayed much ingenuity and knowledge of science, to show that the want of reptiles in moss is a proof of some peculiarly noxious quality in that earth. And in page 564, he says that no species of fish do exist in liquid moss; and neither fishes, nor any living creature, can be detected in moss water, if stagnant and unmixed.

But, with due submission to authors of superior erudition, I can discover no mystery in the want of worms and reptiles in solid unbroken moss below the soil. If I understand reptile economy, they are never found beyond the bounds of the soil, or the reach of the moisture that passes from it, and is impregnated with vegetable matter. Worms, and all sorts of animalcula, live upon vegetable matter in the soil that has come under fermentation. It is in such situations that they are found; and it is upon that which they live. In unbroken moss, there is scarcely such a thing as a soil. There is little or no fermentation or decomposition of vegetable matter, even on the surface of unbroken moss, which is close and solid, and where the vegetable matter is insoluble and antiseptic; and, there being no food for them, the animalcula are not found there. Neither is the mole found in such moss. That creature lives on the animalcula, as they do on the vegetable matter when under putrefaction. That being awanting in moss, there are no animalcula, and as few moles. But whenever the moss is dug up, and fermentation and decomposition brought on the vegetable matter, by the acid of manure, exposure to the atmosphere, or either means, armies of worms and animalcula are raised, and troops of moles are found in chase of them.

Dr. Rennie says—"Certainly living animals may be detected much deeper in other soils than in moss." The Doctor is certainly correct in that assertion; and the reason is obvious. Other soils are generally more open and permeable than solid unbroken moss. The herbage that grows on them is not of an antiseptic quality, like that on moss; but, whenever it ceases to grow, it yields to complete dissolution by putrefaction. The vegetable matter so dissolved, forms and enriches the soil; and the vegetable juices are washed in, and sink into the earth to a considerable depth, according to the permeable nature of the ground; and wherever these go, the animalcula will be found. But, in moss, there is no such thing as vegetable matter under putrefaction. If it were, the close texture of that earth, would prevent it from sinking even a few inches; of course, there can be no worms nor animalcula there. The want of them does not proceed from any noxious quality in the moss pernicious to animal life.

Fishes, and every sort of living ceatures that occupy stanks, and small streams, where there is no moss water, are found in those which are entirely composed of that species of water. There are hundreds of burns, rills, and standing lakes or pools of water, in all the counties in Scotland, situated in the middle of deep moss, and into which nothing but moss water can ever fall; and yet these streams, pools or stanks, are stored with various sorts of fish, and all the living creatures that occupy places where there is no moss. The *Blackburn*, parish of Crawfordjohn, rises in, and runs through moss, is composed of moss-water, and nothing but moss-water, dark and brown; yet it yields the largest, the best, and the greatest number of trouts that are to be found in any stream of the same size in Scotland. The lochs, streams, and stanks, that abound at the head of Loch-Dum in Ayrshire are entirely composed of moss-water; yet fishes, and many living creatures, abound in all of them.

I did not intend, when I began to write, to have occupied so much of your valuable room on *this part* of the subject; but an ardent wish to render every thing regarding that substance clear to the simplest cultivator, and to remove objections that seemed to stand in his way, has carried me further than I intended to have gone.

III. *The Uses of Moss-earth.*

Are, 1. *Fuel;* 2. *Pasture;* 3. *Plantation;* 4. a *Cultivated soil;* and, 5. *Manure.* I shall offer a few remarks on each of these in their order.

1. Moss is, next to coal or wood, the best fuel yet discovered. Where either of the former can be obtained, it will seldom be used; but where these are not plenty, or far distant, peat is the best substitute.

The mode of cutting and drying peats is so well known to every laborer in all parts of Scotland, that it would be trespassing upon your patience to spend time in describing it. Except in some parts of Galloway, where moss fit for fuel is scarce, the mode of baking peats, so common in Ireland, is not known in Scotland. The superior quality of the peat, however, in some measure indemnifies the additional labor.

The greatest improvement that I could suggest in the management of peats, would be to erect shades to keep them in during winter. When set up in the ordinary way, in stacks, altogether without cover, every heavy shower renders them unfit, for a time, to be used as fuel. When a course of rainy weather happens, it becomes extremely difficult to get the cookery for the family carried on with peats; while the smoke which they emit, fills and darkens the house in which they are burnt; and every time that peats are wetted and dried, their adhesive texture is so much loosened, and their inflammability, and durability as fuel, diminished.

A shade to hold peats for one year, might be formed of couples of an old house, or other old timber, which is frequently left to rot, and thatched with heather, broom, or rushes, in the time that the farmer and his servants spend at races, fairs, roups, &c. where they have no interesting business; or in the time they are employed building the peats into a stack. It ought to be so constructed, as to admit a current of air to pass through the shade.

2. Moss-ground is used as pasture, chiefly for sheep stock. The improvement that seems practicable on this species of pasture is, to adjust the quantity of moisture, and to provide shelter for the stock.

By far the greatest part of the sheep-walks in Scotland, composed of moss, are greatly injured by being overcharged with moisture, which banishes the valuable grasses, and raises the moss-fogs; and the sheep are much hurt, and frequently drowned in the gutters. To remedy these evils, the whole moss-ground ought to be surface-drained. The mode of doing so with spades is well known. Perhaps some part of it might, in favorable situations, be executed by the plough.

By opening the surface drains where necessary, the value of the pasture may frequently be more than doubled—the growth of flow-moss retarded—the moss consolidated and prepared for more improved culture—the climate bettered, and the condition of the stock greatly meliorated. I know no improvement by which so much good could be done, at so small expense, and with as much certainty of being refunded. In many cases, the pasture could be surface-drained by the shepherds, in the course of a few years, without interfering with their duty to their flocks. But the indolent habits of the pastoral life are not easily overcome; the herds continue to loiter, half idle, on the hills, and the sheep to wade in the gutters as formerly.

In some situations, large tracts of sheep pasture and moss ground could be much improved, by turning streams or rills of water over it. Earth, sand, mud, &c. might frequently be thrown upon such pasture by means of a mountain rill, that is neglected, or suffered to do much injury. I saw an improvement of that nature, executed by the Bishop of Llandaff, whereby he had reclaimed a few acres of moss, of the least value, near Colgarth House, on the side of the Windermere lake, and converted it into pasture, which grazed a large milk cow on each acre, formerly not worth one shilling. If every acre in Scotland, capable of being reclaimed in that way, were brought to as great perfection, the profit of the occupier, the proprietor, and the public, would be beyond calculation.

When I surveyed the county of Ayr, I was much pleased with an improvement of that nature, executed by J. Cochran, esq. of Ladylands, on some high land of his, near to the head of the Garnock. By turning a rill from the hills, over a piece of bleak ground, which produced little herbage but white bent *(nardus stricta)*, stool bent *(juncus squarrosus)*, with yellow fogs *(hypna)*, and some grasses of a dwarfish size, he was enabled, two years after, to cut 4500 stones, English, of good hay from 11 acres, formerly not worth in all 2*l.* sterling of rent. Like other improvements, it only excited laughter and clamor among the country people; but now that it has succeeded so well, I trust they will follow his example. Many thousands of acres might be improved in that way in Scotland, so as to yield 50or 100, perhaps 300 per cent. on the expense incurred.

3. Plantations may be raised to great advantage, and with much success, on a moss soil. I have seen many different kinds of forest trees growing with great luxuriance on mosses of considerable depth, in almost every county of Scotland, and in all the counties of England, in which I found moss. Not only birch, mountain ash, saughs of various kinds, alders, and other aquatics, but firs, larches, spruce, limes, beeches, elms, and oaks, grow well on mosses of great depth; and all of them, with several other kinds of trees, may be seen in many deep mosses.

When plantations of any kind are to be raised on moss, it is necessary not only to relieve the surface of moisture; but, if the moss is deep, and has little declivity, ditches also ought to be cut, three or four feet deep, at the distance of fifty or sixty feet, at most, from each other. The moss-earth taken from the ditches should be laid into hollow parts of the intermediate ridges, which should be smoothed, and raised in the centre, that the rain-water may run speedily into the ditches; and these ought to communicate with the principal drains, so that no water may remain in the ditches. If the ditches are properly formed, and kept clear, and the surface of the ridges to be planted kept smooth, and free from stagnant water, planting will grow well, and turn to good account, in any kind of moss not more than 1000 feet above the level of the sea. Even in greater altitudes, trees can be raised, in convenient spots, to a sufficient height for ornament to the country, and shelter to the sheep. What beauty would it give to the country, and melioration to the condition of moor stock, were a few clumps or belts of any kind of trees raised on the sheep walks! A plantation to the extent of half an acre, may be enclosed with a dike of sod sufficient to turn cattle, and shelter

the young trees, for 40*s.* or 3*l.* Thirty or forty such clumps might be raised over a sheep-walk for about 100*l.*, or less than one year's rent; while the shelter they would afford, and the beauty they would give to the aspect of the country, not to mention the value of the trees, would much more than compensate that trifling expense. It shows great want of taste to neglect an improvement so cheap, so necessary, so valuable, and tending so much to ornament the face of those dreary regions.

4. Moss may also be used as a cultivated soil, for the raising of grain crops. Until of late, the proprietors and possessors of moss-land, were ignorant of its value as a cultivated soil, and contented themselves with the pasture it yielded, and the *game* it produced. Those who first talked of raising grain, or roots, from moss, were held up to derision; and to this day moss-culture is laughed at, and considered as a whim, even by the generality of farmers. Fortunately, however, for mankind, and particularly for Britons, it has been ascertained, beyond all doubt, that moss is as capable as any other soil of being reclaimed, and rendered productive of all sorts of grain, grasses, and useful roots. Convinced of these facts from my own experience, and from that of others, who, for near thirty years past have raised the best crops from even the worst of mosses, I turned my attention to the subject with much ardor; and having travelled several thousand miles to see how these operations were conducted, I now beg leave to lay the result of all my studies and inquiries on that subject before the public, through the medium of your valuable Magazine, with the sincerest wishes that they may be reduced to practice, and that my countrymen may reap therefrom that benefit which I have the fullest conviction it is capable of yielding.

1. When the cultivation of *hill-moss* is attempted, all that is necessary is, to reduce the land to a proper form, apply manure, and adopt such a mode of cropping as that species of soil can admit of. In this kind of moss, the subsoil is the chief thing to be attended to. The incrustation of moss, or black mould approaching to moss, is seldom of sufficient depth to form a soil. The subsoil may be added to that of the moss; and the operations will fall to be regulated by the quality and condition of that subsoil. If it be clay, it would require to be ploughed and exposed to the weather, a year or two before it is cropped; if sand or gravel, as is most frequently the case, it will fall to be treated like other new or poor land of that description. This subsoil will, like all other newly broken up ground, be almost void of vegetable matter; that on the surface is sufficient to supply the defect; but, being insoluble, it would need to be reduced by caustic lime, or other stimulants, which tend to accelerate the decomposition of moss-earth. If the soil is sandy, too much exposure to the summer drought would tend to render the moss-earth still more insoluble, and could do no good to the sand. After one or two crops, it ought to be laid down with grass-seeds, and pastured for three or four years. Potatoes and turnips are proper crops for such land. These may be followed by barley or oats, with grass-seeds. Green crops would, by overshadowing the ground, bring the original moss-earth in the soil into a state of greater solubility, and accelerate its decomposition.

No. II.

Strathaven, 1st October, 1811.

Sir—My last communication concluded with directions for breaking up, and reclaiming *hill-moss*, or that species of waste land where, from its declivity, or the permeable nature of the subsoil, the moss earth has only risen a few inches, not in proper moss, but in a sort of dry, deaf, inert, black mould, approaching to moss. The method there recommended in cultivating such land, is the same as would be proper to be pursued if the ground had been altogether free of such incrustation of moss; with a due application of hot lime, and other stimulating manures, to render the vegetable matter, which has grown over the surface, soluble; reduce and separate its organic parts, and convert it into manure for succeeding crops. If the soil, over which the incrustation of black earth has risen, be clay, or of a dense quality, it would require to be fallowed for two seasons, to dry it, open its pores, and render it fertile; but if the soil be sandy, as is most common under that species of moss, fallowing could be of no use, further than one course, to reduce the surface to proper form. A crop of potatoes or turnips, with dung and some hot lime to bring the moss-earth into putrefaction, followed by a white crop with grass-seeds, would be the most proper course in sandy or dry soils.

With these directions I intended to have closed that part of the subject. But as I find, from a correspondence which I have had with the Board of Agriculture, for whom I have undertaken to draw up the chapter on waste lands, of the General Report for Scotland, that the honorable Board, and their intelligent Secretary, are partial to the English mode of reclaiming every species of waste land by *paring* and *burning*, I find it necessary to say a few words more on the subject.

I am not a stranger to that mode of reclaiming waste land, having seen it practised in many parts of England, and sometimes in Scotland, and read many excellent communications to the Board, county surveys, and other agricultural writings, wherein paring and burning was recommended, nor only on waste land, but also on the richest and best old pastures. But as these plans of improvement did not seem to me the most eligible, I endeavored to shun disputes on that subject, as to the breaking up of waste land; disapproved of burning (especially in the way it is generally executed in Scotland) as to moss; and reprobated, in strong terms, the practice of paring and burning old rich pastures.

My observations on these subjects did not meet with the approbation of the intelligent Secretary; but whatever may be my opinions on that, or any other subject, it would be presumptuous, and most unreasonable, for me to insist on their being preserved in a General Report; which, though the original sketch be drawn up by individuals, is ultimatley to be laid before the Sovereign and both Houses of Parliment, as the result of the labors and opinions of the honorable Board.

In communications, however, of this nature, written and signed by myself, I trust I shall give no offence even to those who may differ from me in opinion thereanent, by stating with candor, and all manner of freedom, my sentiments on that subject. I am still humbly of opinion, that to

pare and burn the accumulated vegetable matter formed on the surface of rich old pasture, is a practice as barbarous as any that ever sprang from conceited ignorance. I shall state my opinion of burning deep moss, when I come to treat of reclaiming *flow-moss;* but it is also necessary to notice here, how far it seems proper, in the species of waste under consideration.

I am humbly of opinion, that, wherever a thin incrustation of moss-earth, or black mould approaching to moss, is found incumbent on, or has been mixed, by the plough, with a cold, damp, adhesive, meager clay soil, and that moss-earth or vegetable mould has become (as it generally is in such situations) more insoluble than ordinary moss, and cannot be reduced to putrefaction by the caustic powers of lime, or others the most stimulating manures; burning the moss or black mould, and torrefying, with it, as great a portion as possible of the steril adhesive clay, is the most proper course that can, in all such cases, be followed In all other situations that I know, burning produces a luxuriant crop or two, at the expense of those that follow; but, in the case here recommended, the burning corrects the greatest defect in the soil, and renders it capable of permanent fertility.

The great defect of a poor, damp adhesive clay soil, is, that it is so close in its pores, that moisture cannot escape, or the roots of vegetables penetrate. It is cold, chilling mortar, when wet, and adhesive clods when dry. The vegetable matter formed from the crops that grow on such soils, in high districts, and even the dung that is applied to it, is chilled, and kept stationary, by the cold clay, and moisture which it retains. Until its pores are opened, it will not become fertile or productive.

Burning the moss, or insoluble vegetable mould, on such land, and torrefying as large a portion as possible of the clay, is, of all other methods, the most proper, with land of that description. The ashes of the moss, or vegetable matter, which could not be rendered sufficiently soluble, by any other means yet known, will yied a crop or two; and the burnt earth, being mixed into the soil, will open its pores, to let the chilling moisture escape, give scope to the roots of plants, and render it capable of permanent fertility.

As the burning must have exhausted the whole vegetable matter in the soil, and as no ground can be productive until it is impregnated with such matter, in some degree disposed to yield to putrefaction, I would recommend to apply, after the first crop, a good dressing of moss compost, that has been brought under fermentation by being mixed with dung, lime, or some other stimulant, before being spread on the soil. After the pores of the clay have been opened by torrefaction; and the mass brought into a proper state of putrescence, by dung, &c. before it was applied to the soil, there will be no danger of that moss becoming again insoluble, like that which had been formed on the adhesive clay soil where its decomposition was retarded by the chilling damps in the soil.

It does not often happen, however, that a thin incrustation of black-mould, like ill-formed moss, is found upon a damp, cold, adhesive clay; but, more generally, over a lighter and opener soil. When the soil is close and retentive, the bent or the flow-moss, of much greater depth than that here treated of, is generally formed.

Where the soil is already sufficiently open to the escape of moisture, burning, to render it more loose, would be injurious; and to burn any black mould or moss collected over a sandy or gravelly soil, would be a gross error, and folly. The black mould, steril as it may be, that covers sand or channel, forms a much better soil for cultivation than that of sand gravel, or rock: and as by far the greatest part of hill mosses is incumbent on a sandy or open soil, burning ought to be practised on such land with caution.

Some have recommended burning, in all cases where the soil was covered with coarse bulky herbage that could not be otherwise reduced to putrefaction.

Wherever coarse herbage, or vegetable matter of any kind, is found to be so insoluble, as to baffle the fermenting powers of lime, or other stimlating manures to bring it into putrefaction, it certainly may be burnt, unless it be found that the subsoil on which it rests would form a worse soil than the vegetable earth. But I am humbly of opinion that, except when it is incumbent on a cold, adhesive, damp clay, neither the coarse bulky herbage which grows on such waste land, nor even the black vegetable mould or moss formed from them, when under a slow and partial decay, are so completely insoluble as not to be made to yield to the dissolving powers of hot lime, or the fermenting qualities of good dung.

If either recent vegetables, however, or vegetable earth, formed chiefly from plants that have grown on the surface, is found to be so insoluble as to resist the powers of lime, they ought certainly to be reduced by fire, in all cases where the subsoil is better adapted to cultivation as an improved soil, than that of the vegetables or vegetable matter by which it is covered.

In situations, too, where the moss-earth and coarse vegetables on the surface are abundant—no lime nor stimulating manures at hand to accelerate their decomposition—and where the subsoil cannot be injured by the burning, or admixture of the ashes, and charred or torrefied peat or earth; some part may no doubt be burnt to raise crops, and bring on better herbage. But these seem to be the only cases in which that operation can be executed with advantage—or, I would rather say, without injury; as will be more fully stated when I come to notice the effects of burning on flow-moss.

I do not advance these doctrines to provoke controversy, but merely as candid opinions which I have deliberately formed, after the fullest investigation of the subject, both in theory and practice, for many years. Others will judge for themselves.

II. *Of the cultivation of bent-moss.*

When bent moss, which is always covered with a bulky sward of green herbage, is to be cultivated, all that is necessary, is to relieve its surface of moisture by furrows opened with spades, or drawn by the plough; apply lime in a caustic state, and labor and crop the ground.

The ground ought to be completely surface-drained, at least six months before the lime is put on. The best method is to form furrows in the directions wherein it is proper to carry the ridges; or, at least, one furrow for every two ridges; and

the turf taken from them may be applied to fill up the low places on the surface. And if much inequality shall still prevail, some of the knolls may be pared, and what is taken from them laid into the lower places.

The lime ought, by all means to be applied in its most caustic state, that it may the more powerfully reduce the coarse herbage to putrefaction, and convert it into the food of plants. If the lime has become effete before it is spread on the sward, its effects in reducing the coarse herbage will be much diminished; and the lime ought to remain a year or so upon the sward before it is labored.

If the surface of the ground be tolerably smooth and equal, the bent-moss may be ploughed; but if it abounds with inequalities, it will be much better to dig it with the spade. When ploughed the first year, some delve it with spades the second, to break the extreme tenacity of the furrows, and reduce every inequality of the surface which cannot be so easily done by the plough. But I would rather advise the cultivator to labor the bent moss with spades for the first year; as, in that case, the soil can be cut and formed much deeper than can be done by the plough; and when once it is cut into spadefuls, it can be much easier ploughed for next crop, than when it remains in tough furrows, formed by the plough. It ought to be labored in harvest, so as it may get the benefit of the winter frosts, to reduce its texture, before it is dried into peat. The earlier it can be sown, the better; and as the mould will not be properly formed, the seed ought to be covered chiefly by hoeing for the first year; and the roller ought to follow the hoe or harrow, as it completes the covering of the seed, and consolidates the soil to keep out the drought.

The ridges ought to be formed about thirty or forty feet wide, made as regular as possible, free of heights and hollows, raised a few inches only in the centre, and the furrows about a foot wide, and eight inches deep. Nothing is more hurtful to any species of moss, than the slightest inequality on the surface of the ridges. The low places will be injured by two much damp, and the heights by want of moisture.

Three crops, at least, are necessary for the right formation of the soil in bent moss. They may be all of oats—that being the most certain and generally the most profitable crop; and it is impossible the soil can be in the least degree exhausted by such a course. I have known moss cropped with oats, without rest, or intermitting crops, for eight or ten years. But though the soil may not be exhausted even by that barbarous course, it becomes too loose, dry and open, and overrun with couch grass. Moss is always most productive when kept in short rotation shifts, and in a moist condition.

Bent moss may be sown with grass seeds in the third year; cut for hay one year and pastured for two, or at most for three years: a small quantity of hot lime (say thirty bolls or so, per acre) may then be put on the sward; one, or at most two crops of oats taken, when the field may be again sown with grass-seeds. If moss is kept more than two years (after the first course) in crop, it becomes dry; or what the country people call *deaf*: and if it is more than two or three seasons in pasture, the rich grasses die away; the rushes and marsh fogs spring up in the low; and the dry fogs, and even heather, in the higher places, and it soon becomes wild. But if one or two crops of oats are taken; one crop hay; and one, two, or at most three years pastare; the moss will be kept in most productive state; and, by the aid of a very small quantity of lime, every five or six years, it may be made to yield more grain, more hay, and as much pasture-grass, as can be raised on any other description of soil. What folly and misconduct must it not then be, to allow one single acre of such land to remain neglected! There are few counties in Scotland, where there is not as much bent and hill-moss, capable of high cultivation, as would give employment to hundreds of families to cultivate, and raise food for thousands of additional inhabitants. Yet we continue to keep too many of our people cooped up in loom-shops, cotton-mills, and other unwholesome manufacturies, to the injury of their health and morals, while a market cannot be found for the goods which they manufacture; and we are paying millions of our guineas, every year, for corn, to our most implacable enemies. The population of Scotland might be greatly increased; the food of man multiplied; and the physical strength of the nation augmented, to an incalculable extent, by the cultivation of hill and bent moss.

Of Flow Moss.

Flow moss presents an aspect to the cultivator so extremely forbidding, that, till within these few years, it was considered by all ranks of farmers as incapable of being reclaimed, or rendered productive of grain or good grasses; and it continued to be, as it were by mutual consent, altogether abandoned as to improvement. Happily, however, it has been ascertained, beyond all manner of doubt, that flow moss, if it can be laid dry on the surface, is as capable as any other soil of being made to yield the most valuable crops of the best of grain, roots, and grasses.

Even the venerable Lord Kames, the great patriarch of agriculture, seems not to have perceived that flow moss was capable of being reclaimed, when he invented the ingenious mode, still carried on by his son, of floating it into the sea, in order to recover the subsoil which it covered.

I was anxious to have ascertained who it was that first discovered that flow moss was capable of being formed into a productive soil; and, after making much inquiry, I have not been able to procure evidence of that species of soil being brought under cultivation, in any other place in Scotland, so early as at Strathaven in the county of Lanark; and the person who first set the example, was the late John Hamilton of Collin-hill, at, or soon after the year 1750. If it should be alleged, as formerly, that I have discovered "a sort of districtal vanity" in this matter, I would answer, that I should have been equally happy to have traced that honor to my native county of Ayr. But, though the agriculturists of that county began early to improve bent moss, Mr. Hamilton, and others about Strathaven, were before them in the improvement of flow moss. If any other can claim it prior to the middle of last century, let them take the honor, to whatever district it may be found to belong.

Happily, the cultivation of even that most forbidding of all species of soil, does not now rest on mere speculative theory, but is a matter of fact, well founded, and ascertained beyond all manner of doubt; not in a few, but in many instances, and to the extent of thousands of acres, in many different counties of Scotland and England. The manner in which that has been done, falls to be made known and attended to, that others may follow the examples set before them.

Of Draining Moss.

Draining is the first step towards improvement of flow moss; but this requires to be executed with caution. Such moss, in its natural state, is too wet, and too soft; and, to remedy these evils, proper channels ought to be opened, to relieve the surface of every drop of stagnant water. If the surface of the moss is nearly level, the drains ought to be deeper, and more numerous; but wherever it has a tolerable declivity, furrows, of a foot in width, and six or eight inches deep, leading into cross drains, and these into a main drain, in the lowest courses of the moss, is all that is necessary, or can be of service. Under-draining, trenching, or any other operation to render the moss dry, more than merely relieving all parts of the surface of stagnant water, is not only labor lost, but highly injurious to the moss as a cultivated soil. Moss is no doubt too soft when wet; but is also too hard when it is dry. It takes in too much moisture in winter, but it is always too dry in spring and summer. Where the surface is so formed, as to allow the water to run off as soon as it falls from the clouds, cultivated moss cannot be kept too wet. A cultivated moss soil always yields the best crops, in a wet, and the worst in a dry season. Moss, after being dug up and formed into a soil, will dry more in one day, than clay, or even loam, will do in a week. Theoretical writers have said much about under-draining, trenching, &c. to render moss dry; and many, in the outset of their cultivation of that species of soil, have thrown away large sums in cutting deep ditches, under drains, &c. But they have generally discovered their errror, and restricteu their draining of moss, merely to a removal of the springs, and relieving the surface of stagnant water.

Of Laboring Moss.

The ridges ought to be formed broad, and nearly level. If the moss is very damp, with little declivity, the ridges may be formed twenty or twenty-five feet broad at first; and two of these may be put into one, the second time the moss is cropped. The ridges may be raised about six or eight inches in the centre; and here, as in the bent moss, care ought to be taken that there be no heights or hollows in the ridges. If any such are formed, the heights will be unproductive, by being too dry, and the hollows, by being too wet.

Flow moss has generally, when first broken up, been delved with spades: but Mr. Lauder, overseer to General Graham Stirling, of Duchery, and James Hume, esq., from East Lothian, who has reclaimed some deep moss near West Linton, have found means to break it up with the plough. A concise account of both methods falls to be given.

When dug with the spade, the soil is cut a proper depth, and ridges are completely formed at the first. The moss ought to be labored during the latter part of harvest, or early in winter, so as it may be reduced to soil by the frosts and showers of winter, before it is formed into peat. In this description of moss, it is best to allow it to remain exposed to the weather, for *at least two winters*, after being delved, and before cropping, so as the soil may be more completely formed. The manure may be cartied on, in time of drought in summer, or frost in winter; and a deep hoeing, or slight delving given, about the Martinmas time, the winter before the seeds are sown. Mr. Lauder's method is, to cut a drain round four or five acres which also serves as a fence, and to form as many small drains, as to relieve the surface of moisture. After these have been open for a year or two, he ploughs the enclosure in time of the greatest drought, and leaves it exposed to the weather for one or two years more; then taking the advantage of dry weather he gives it two or three ploughings, puts on manure, forms the ridges, and leaves it exposed till the next spring, when he sows oats. If the soil is well formed by these operations, he sows grass seeds on the first crop; but if it is not formed to his mind, he ploughs immediately after the corn is reaped, and takes a second crop of oats, with which he sows grasses.

Mr. Gow, overseer to Neil Malcolm, esq. of Poltalloch and Duntroon, Argyleshire, who had, when I surveyed his improvements in 1809, reclaimed more than 1000 acres of deep flow-moss, and who had tried many experiments, now generally delves and forms the ridges, from fifty to one hundred feet broad, and nearly level; leaves the moss, so dug exposed to the weather, for eighteen months or two years; then gives it a good dressing of lime, or sea shells; digs it over a second time, breaking the turf, and smoothing the surface and sows grass seeds in the month of July following, without taking any other crop; pastures with sheep the first year or two, and with cows afterwards. When the pasture begin to fail, he applies a new dressing of hot lime; I am humbly of opinion, however, that a crop of oats might be taken to advantage, after the second liming.

Though several other modes of breaking up and cultivating moss, have been pursued, and with considerable success, these seem to me to be the most advisable, and safest courses of procedure. Some have cropped even deep flow-moss the first year after it was dug up; but the crops, in such cases, have seldom been equal to the seed sown. It is much better to allow the moss to remain exposed, for a year or two, to every change of the weather, till the peat be reduced to soil by the alternate frosts and thaws, rains and droughts. When it gets frost immediately after being dug up, it more readily falls into soil, than it does after being first dried into peat.

Of Manures.

The manures most proper for flow moss, are those best for any other soil; as dung, lime, and compost. Even earth, sand or any other substance that the vicissitudes of the weather can reduce to the state of earth, will operate as an excellent manure to moss. Dr. Anderson, and the

gentleman who describes the moss cultivation at Swinridgemuir, both seem to doubt the effects of dung as a manure to moss; but nothing has been better ascertained respecting it, than the powerful effects of dung as manure to that species of soil. No other manure will operate, so speedily, so powerfully, and with so much certainty, as dung upon flow moss. Dung was the only manure applied to Strathaven moss, for fifty years after it was first broken up. And when it is considered, that more than three-fourth parts of what had begun to be cultivated, was, during that period, generally in crop with oats, and yielded from ten to fifteen bolls per acre, with no other manure than about five or six tons of dung per acre, put on with the seed, every second year; it is but fair to conclude, from that instance alone, that dung operates as an excellent and powerful manure to the deepest and worst of flow moss. But many other instances could be given, if necessary, of the effect of dung as a manure to that species of soil.

If dung can be obtained, a moderate dressing ought, by all means, to be applied to flow moss, the first time it is cropped. Other manures may (especially if it is exposed to the weather till the soil be well formed,) render even flow moss productive; but nothing will produce an effect so speedy and certain as dung—which not only enriches the soil, by communicating to it, its fertilizing qualities, but also brings the moss into a state of putrefaction, thereby converting it into a manure for itself.

Dung is generally spread on moss at the time the seeds are sown; and it usually gets no other covering, but by the harrow. But as dung, when exposed to the sun and drought of spring, loses its best qualities, which are exhaled and carried off in gas, it would be much better to put it on in October or November, that it might be washed into the soil before the frosts come on, which are supposed to injure the dung.

Lime, and every species of calcareous earth, operates as a powerful manure to moss. John Naismith, esq., an author of much intelligence and respectability, seems to have entertained doubts of the effects of lime as a manure to moss, from its not having succeeded in some of his flower-pot experiments, where he mixed one-fourth of hot lime with three-fourths of moss. But, whatever might be the results, in experiments where the proportion of lime was by far too great, I can venture to say, with the utmost certainty, that lime, and every calcareous substance, forms the very best of manure to moss. The acid in moss, and the alkali of lime, encounter, effervesce, destroy each other, and form a neutral salt, which is highly propitious to vegetation. As the acid in moss is one of the chief causes of its insolubility, the reduction of that acid renders the vegetable matter, of which moss is composed, soluble, and thereby converts it into the food of plants. If moss is entirely destitute of a green sward, the operations of lime as manure, though certain, will be slow. But on moss covered with coarse herbage, as bent moss, or where a sward of grasses, or green herbage, has been brought on by cultivation, lime, and nothing but lime, ought to be applied. I have seen thousands of acres of moss, of all descriptions, reclaimed, and rendered highly productive, by the application of lime alone as manure. Scarcely any other manure has ever been applied, either to the bent mosses on the estates of Grougar, Glesnock, and many others in Argyleshire: or even to the deep flow mosses, that have been reclaimed at Riccarton, Shoulton, Montgreinan, Glesnock, &c. &c. The most extensive, and best conducted improvements of moss, to be met with in Scotland, are on the estate of Hartfield, near Paisly, executed by Robert Fulton, esq.; and lime has been almost the only manure applied, either to the hill, bent or flow mosses. No other manure but lime has been used in the improvement of the deepest flow moss at Rednock house in Monteith, Perthshire, or at Duntroon, and many others that I have carefully surveyed, and described in my last publication.

Earth, clay, sand, rotten-rock, and every substance whatever, that falls into powder, by the influences of the weather, forms an excellent manure to moss. Rich mould will no doubt have the speediest and greatest effects; but any other earth, however steril, or however far below the surface it may come, will penetrate the moss-turf; divide its vegetable fibres; give it solidity; which, it much wants; bring it into putrefaction; and render it productive of grain and rich grasses. John Mackenzie, esq. of Garnkirk, James Hill, esq. of Gartsheugh, Dr. Jeffery, and others, who have made extensive and spirited improvements on deep flow mosses, in the vicinity of Glasgow, and rendered them productive of the best crops of all sorts of grain, applied considerable quantities of clay, or other earths, as manure to their mosses; and with great success. Burnt clay, is said to be a powerful manure to moss; but I have not been able to discover that it has ever been used to such extent as is necessary to ascertain its effects, compared with the expense of preparing and laying it on.

Thomas Leisk, esq. of Luna in Shetland, informed me, some time ago, that some mosses in that part had been rendered productive and brought into a state of putrefaction, by the application of *sea-water*.

Burning part of the moss, for manure to that or any other soil, seems to me to be, of all modes of improvement, the most exceptionable. When pure moss is burnt in the open air, nineteen parts out of twenty of its substance, is sent off in a gaseous state, and irrecoverably lost to the cultivator. The real ashes of a ton of pure moss, would not fill a man's hat. The salts, &c. which they contain, generally produce one great crop, and one of a very moderate value; after which, the moss becomes very steril, and cannot so easily be again rendered productive.

It is scarcely possible to reduce peat completely to ashes, even in a grate, and when perfectly dry. The one half of what falls into the ash-pit, is not ashes, but cinder, or char; and when the damp moss is set on fire, without either being cut up or dried, as is generally done in Scotland, the proportion of cinder, or char, must be greater, and that of the real ashes smaller. These cinders, left in the soil, are as insoluble as so much water-sand, and nearly as light as their bulk of cork, rendering the moss soil more open and permeable than before; the greatest defect to which it is liable. The consequences are, that wherever part of the moss has been burnt, the chief plant that it produces, in a few years after, is the *bryum purpu-*

reum of Linnæus, or *dicranum purpureum* of Dr. Smith; a plant of no manner of use, and which is only found growing on the turf ridges of houses or stone-dykes, parapets of bridges, the rubbish of old buildings, or other places so destitute of moisture, that they cannot be made to yield any valuable herbage.

Cropping.

The crops raised on cultivated moss are, *grain, roots, and grasses;* all of the very best quality.

Of grain raised on moss.

Wheat has grown most luxuriantly, and of the best quality, on Trafford moss, near Manchester, improved by William Roscoe, esq. of Liverpool, and others; at Castle-head, in Lancashire, improved by John Wilkinson, esq.; at Gartsheugh, near Glasgow, improved by James Hill, esq.; and on many other mosses, of great depth, and of the worst quality.

Oats, which seem to be the crop best adapted to that species of soil, have been raised on many mosses, in various parts of Scotland and England. Ten bolls per acre have been considered as no more than a medium crop, on the moss of Strathaven. Seventeen bolls of corn, which yielded more than twenty bolls of meal, was, in 1803, reaped from two fields of Paisley moss, improved by Andrew Moody, esq. In 1806, that gentleman, from two acres, two roods, and twenty-seven falls of deep moss, which had received no manure during the three preceding years, obtained thirty bolls of oats, which brought seventeen pecks of meal each boll; and the fodder sold at 13*l.* 10*s.* M. Bell, who improved part of that moss, sold a field of oats, crop 1806, at 15*l.* per acre; and from one acre and two roods of said field, twenty-six bolls of good oats were reaped. I have never seen better crops of oats grow from any species of soil, than upon some fields of very deep moss, near Rednock House, in 1809, and on the farm of Rushaw, on the estate of Grougar, Ayrshire, as well as on Strathaven moss, and many others.

Oats, and indeed every other crop, put upon a moss soil, ought to be sown and harrowed in as early in the season as possible, before the ground gets too dry. As drought will make greater progress on a cultivated moss soil, in one day, than it will do on some other land in a week, it is best to put in the seeds in moss, when between wet and dry, so as it may be sown and harrowed before other lands are ready to receive the seed. Harrows, made to be drawn by men, are requisite in mosses for a few years after being broken up. Horses would mire, at first; and even when moss has become more solid, their feet make holes, which are afterwards filled with water, to the injury of the crop. After the moss has been formed into a soil, the seed may be covered with a harrow of brushwood, drawn by men.

Early oats ought to be sown on moss; not because the crop on that soil is late of growth, but because the oats that are late run too much into straw, and lodge, if the season is wet.

In all cases, the roller ought to follow the harrow; to smooth the ground; cover the seed; squeeze up moisture to the surface; consolidate the soil; and prevent drought from so readily penetrating: and the oftener the roller is drawn over the moss, from the time the crop is sown, and before the growth is too far advanced for that operation, the better crop may be expected. Rye-grass and clover on moss, ought to be frequently rolled in autumn and spring, to prevent the plants being thrown out of the ground. A roller for moss ought to be made of wood, three or four feet diameter, light, and mounted to be drawn by men. The moss is too soft to bear a heavy roller; and the ground, by sinking under it, and rising before and behind, would rend, break the fibres and roots of the crop, and make openings to let in drought.

Barley and bear grow well on moss. I found, in 1805, an excellent crop of bear, growing on moss, near the Ord of Caithness, improved by the right honorable Sir John Sinclair.

Rye has proved a valuable crop on many different mosses. At Scalesby Castle, in Cumberland, it yields sixty times the seed sown.

Peas have turned out an excellent crop on moss; on the estate of Garnkirk, improved by John Mackenzie, esq.; on Strathaven moss, and elsewhere.

Beans, as good as ever grew on any soil, were shown me, that had grown on part of Trafford moss, where they form a common crop. The long tape-roots of the bean, sinking into the soil, secures them against drought; by which oats and other repent or fibrous rooted plants, are often injured.

Potatoes were raised on the mosses and bogs in Ireland, about the beginning, and in Galloway about the middle of last century. They grew as well upon cultivated moss, as on any other soil. Mr. Moody, after delving part of Paisley moss, planted potatoes for the first crop, and reaped, from 17½ acres, part of which, was occupied by roads and ditches, 774 bolls of good potatoes, which he sold for 481*l.* 6*s.* 8*d.* From one part of the field, he took up at the rate of ten pecks per fall. Mr. Bell had more than sixty bolls, per acre, on part of the same moss.

Turnips, no way inferior to the best that ever grew from any soil, have often been raised, on the deepest mosses in Scotland and England. I found them excellent on the mosses in Caithness, cultivated by the Right Honorable Sir John Sinclair. Captain Dunlop, factor to Lord Montgomery, took up, in 1808, from a part of Shoalton moss, near Irvine at the rate of 4620 stones weight, per acre, of Swedish turnip. The common field turnips were still more bulky on that moss, and equal to the best in the county of Ayr.

Carrots grow better on cultivated moss, than on any other soil. I saw part of a crop, raised on a flow moss, of great depth, at Castle-head, near Lancashire, which could have been sold at 70*l.* per acre. They yielded 49 lib. per square yard. Some of them were three feet long, and eleven inches round at the neck.

Parsnips are said to be well suited to moss soil; but I never saw the trial made. *Greens, cabbages*, and *cauliflowers*, have been found to grow well on Paisly moss. I saw coleseed, growing luxuriantly, on the Right Honorable Sir John Sinclair's moss in Caithness, in 1805; and several large stacks of the former crop remained on the field.

The *grasses*, suited to a soil of cultivated moss, are, hose-grass (*holcus lanatus*); a grass so well

known, that any description of it here would be superfluous.

Timothy grass, (*phleum pratensis*) has been tried by Hugh Hamilton, esq, of Pinmore, on a piece of moss or deep damp ground, near Belleislie House, in the vicinity of Ayr, and turned out a weighty and valuable crop. William Parker, esq. of Asloss, sowed some part of Riccarton moss in Ayrshire. which he had improved, with timothy grass seeds, which produced the most ample return; and though it was allowed to ripen the seeds, the hay was preferred by his horses to rye-grass hay. Captain Dunlop found it to do well on Shoalton moss, near Auchens House.

Foxtail, (*alopecurus pratensis*), and cats-tail (*phleum nodosum*), both native grasses, found in great abundance in all parts of Scotland, seem to be well adapted to a moss soil.

Clover and *ryegrass* have grown well on improved moss. I have seen the most luxuriant crops of both. on Paisley, and some other mosses. Mr. Bell has sometimes sold his crops of clover and ryegrass, growing on Paisley moss, at 1*s*. 6*d*., 2*s*. and sometimes as high as 2*s*. 6*d*. per fall. And Mr. Tart, overseer to John Wilkinson, esq. of Castle-head, pointed out to me a field of improved moss, of great depth; the crop of ryegrass and clover thereon. in the preceding year (1806), he had sold at 10*l*. per acre. *Ribgrass* (*plantago lanceolata*) has been often sown on improved mosses at Hartfield, and found to grow well.

Though I never saw the experiments made, I am of opinion that couch-grass (*triticum repens*,) would grow well, and yield a valuable crop on moss. It is no doubt a weed in gardens, and cultivated land; but rye-grass, or even oats or wheat would be also a weed among onions or garden plants; oats is a weed among bear, &c. Every plant is a weed when it is not in its proper place. The foliage of this grass is bulky; it is relished by cattle, and makes a weighty crop of the best hay. Its seeds are as easily collected as those of any other grass; and its couchy roots would soon extend themselves over the moss.

If the little patches of moss, lying among, or near to, our arable field, in the higher districts, between the moor and dale, were only dug up, reduced to proper form, some lime or clay put on, and either the seeds of couch-grass sown, or its roots strewed over the moss, it would rise in place of the heather and fogs now growing. After it has swarded over the black face of the moss, it would form a subject for a new dressing of hot lime to act upon; and which, when brought under putrefaction by it, would prove the richest food of a future crop of grain, roots, or better grasses. I have not made due experiment myself of the fiorin grass (*agrostis stolonifera*) to enable me to speak from my own knowledge. But, from the accounts given by many different people, well qualified to appreciate its merits, it appears that this grass is well adapted to a cultivated moss soil.

Hemp and *flax* have been found to grow well upon moss. The long tape-roots of the former, sink deep into the soil, and secure the plant from the injuries, which grain crops sustain by drought; and the bulky foliage of both, would overshadow the ground, and rot the soil. I saw some hemp, of a promising appearance, growing Chatt moss, a few miles from Manchester, improving by William Roscoe, esq. of Liverpool; and the best flax ever seen in that part of the country, was raised on flow moss, by Mr. Sohn James, on the estate of Springkell, Dumfriesshire. The rotations adapted to bent moss, as mentioned above, are also the most proper for cultivated flow moss.

Before I conclude this paper, I beg leave to mention, that though moss culture has hitherto been laughed at, or treated as a whim, by the generality, even of intelligent farmers; yet it no longer rests on mere theory, but has been carried into effect, in so many instances, in different parts of Scotland and England, and with such success, that it may now be held as an incontrovertable reality: and those who first set the example, or recommended the practice of moss culture, may now safely laugh, in their turn, at those who formerly sneered at their theories. Improvements in agriculture began, as they ought, and might have been expected, not on the moors and mosses, but in the more arable districts; while the mosses were considered as irrecoverable wastes. The great rise in the prices of all sorts of cattle, and of their produce, enriched the occupiers of waste land, and made them not only careless about breaking them up, but induced many to allow land, that had formerly been under grain crops, to return to the condition of waste. Industry was confined to the arable districts; and indolence, like a certain people of old, was driven to the hill-country; where it still generally operates so powerfully, that few store-farmers can keep in good temper, if you only hint to them that any part of the extensive wastes which they occupy, are capable of being reclaimed; or of supporting any other species of stock, or adapted to any mode of culture, different from that which they have hitherto pursued. To talk of raising grain, from deep flow moss, cannot fail to excite their contempt. Even when you point out the crops raised on such land; having no other refuge, they will tell you, that nothing of that kind could be done on any part of the mosses on the farms which they possess.

To attempt to argue with the ignorant, indolent, and prejudiced, would be to very little purpose. One instance of successful practice, is better than a volume of the best formed theory. Ten or fifteen bolls of good grain, raised in one season, from one acre of moss, will speak home to the pockets of the occupiers of such land, where their feelings are as strong as those of other men, and have more weight than all the theory that can be advanced. It is much better to show what has actually been accomplished, than to talk of what an ardent mind may think practicable. The one is only speculation; the other is reality. I shall therefore mention a few instances, among many more that I have seen, and detailed, in my last publication, of the profits arising from the cultivation of moss, in hopes that it may excite many others, who occupy that species of soil, still in a state of neglected waste, to follow such laudable examples.

Strathaven moss, Lanarkshire, extending to 200 acres, much of it from ten to sixteen feet in depth, was, in the recollection of some people still alive, set for *half-a-crown per annum*. After part of it had been improved, the rest, which had not been broken up, set at 10*s*. per acre, on leases of twelve or fifteen years, the first year rent-free;

and the tenants drew ample profits during these leases. Some part of it was lately set, for nine years, by auction, at from 2*l.* to 3*l.* per acre. The whole now set at 2*l.* 10*s.* per acre, on an average. Here the rental has been raised, by the industry of tenants, without a penny having been advanced by the proprietors, from 2*s.* 6*d.* to 500*l.* per annum, or 4000 per cent—a profit to the proprietor alone, that far exceeds even the golden dreams of commerce. The profit, to the occupiers and the public, has been still greater. Some part of the crop on Strathaven moss, sold, in the year 1800, at upwards of 30*l.* per acre.

Mr. Moody, on 17½ acres of Paisley moss, of many feet in depth, and which (till he began to improve it) was not worth sixpence per acre of rent, nearly one acre of which is occupied with roads and ditches, has, in the course of six crops, viz. from 1801 to 1806, with about nine acres which were in crop in 1800, raised various species of grain, roots, and grasses, which have brought him upwards of 1800*l.* sterling. James Baird now pays, during a lease, 4*l.* 4*s.* per acre for part of that moss; on three roods of which he grazed in summer 1806, a large milk cow, and cut 30 stones of hay from under her feet. Mr. Bell was, some years ago, offered 4*l.* 4*s.* per acre, during a lease, for that part of the moss which he has reclaimed; but he would not set it under 4*l.* 10*s.* per acre.

The crops raised by Mr. Lauder, on the mosses near Rednock House, in Monteath, which is a wing of Moss-Flanders, (so termed from the vulgar opinion that it floated over the sea from Flanders,) and about twenty feet in depth, have, for the first crop, with no other manure than a moderate dressing of hot lime, yielded always from five to ten bolls; and subsequent crops from twelve to fifteen bolls, and often more, per acre.

Some of the mosses on the estate of Grouger, Ayrshire, have yielded, in oats, potatoes, hay, and pasture, equal to the best land on that fine barony. The pasture on the cultivated moss at Duntroon, was, when I surveyed it, in August, 1808, equal in value to the best I saw in the county of Argyle. A piece of Locher-moss, near Dumfries, reclaimed by Nicol Shaw, esq. has yielded as valuable crops, and was, when I last surveyed it, in 1809, as fine pasture as any in that neighborhood.

I could have mentioned many other instances of successful moss culture, in other parts of Scotland that I have surveyed, solely with a view of procuring information as to that species of improvement.* But as the accounts of them have been laid before the public in my last publication on moss, those here given, may serve as a sample; referring to that publication, those who wish for further details. And as I have already drawn this paper to too great a size for your publication, I shall conclude, with merely mentioning one instance of successful cultivation in England.

The improvements at Castle-head, those of the Bishop of Llandaff, and some by John Sutton, esq. of Materdale, on Uls water, have been remarkably well, and successfully conducted. But as the first of these has been detailed by the Right Honorable Baronet at the head of the Board of Agriculture, in the 5th volume of the 'Communications to the Board,' and it and the others are also described in my last publication, I need not detail them here.

Trafford moss, near Manchester, was rented from the proprietor, by William Roscoe and Thomas Wakefield, esqs., on a lease for ninety-nine years, (and of which about fifteen or twenty years only are yet run), at one shilling per acre per annum; and by the twelfth year, or so, of the lease, that part which belonged to Mr. Roscoe was set to a tenant, at 4*l.* 4*s.* per English acre, per annum, for the first seven, and at 5*l.* per acre for the remaining thirteen years of the lease.

Mr. Roscoe, though he owned to me that he and Mr. Wakefield had run into many blunders in their operations on Trafford moss, has notwithstanding, taken a lease, for ninety-nine years of Chatt-moss, of between two and three thousand acres in extent, at 1*s.* per acre; and when I traversed it with him, in May, 1808, he had about one hundred men and many horses at work, draining, ploughing, delving, manuring, &c. This may serve to show the idea entertained by that worthy and enlightened gentleman, as to the propriety of moss culture, and the profits it yields. When he first entered on that species of improvement, he may fairly be supposed to have been a mere theorist. But after he had cultivated several hundred acres of moss, and run into many errors in the execution of that improvement, he still found it to be not only practicable, but profitable; and he seeks out for a new job—takes no less than between two and three thousand acres—and enters, with redoubled assiduity, on its improvement. He cannot now be termed a visionary theorist, but an intelligent and experienced improver.

If a gentleman, bred to a literary and laborious profession, who has made such a respectable figure as a historian and a politician, and raised himself, by his own industry, to the first eminence in the literary world, and in society—a stranger to agriculture, and living at forty miles distance from the place where his improvements are carried on—can reclaim, to advantage, several thousand acres of the deepest and worst moss in England, and turn it into a source of gain to himself—a fortune to his family for nearly the present century—and return it to the Trafford family, at the end of the lease, worth 20,000*l.* per annum more than when they granted the lease—what might not be effected by many proprietors of that species of soil, in all the counties of Scotland, and their tenants, who have acquired, from experience, more extensive and correct knowledge of agriculture, and have mosses less forbidding, mixed in small patches, with their cultivated lands, with abundance of manure, and every other means of improvement within their reach? Under circumstances so favorable, many of these mosses might be reclaimed at much less expense, and with a greater certainty of profit, than Mr. Roscoe could expect. The con-

* Those made by the Right Honorable Baronet at the head of the Board of Agriculture, on the skirts of the Ord of Caithness, several hundreds of feet above the level of the sea, and almost inaccessible to manure, where the native inhabitants are indolent, and much prejudiced against what they term innovations in agriculture, ought to be held up as a pattern to other proprietors. If every species of waste, of the same value, and equally unpropitious to the cultivator, were improved to the same degree, the food of man, from that circumstance alone, would be doubled, or tripled, in Scotland.

duct of that respectable gentleman conveys a severe reproof to those who neglect the improvement of their mosses; and happy would I be, if I could ring that neglect in their ears, till they were shamed out of their indolence, and set about reclaiming the mosses on their estates in good earnest! They would thereby add to their own rent-rolls, without diminishing those of their neighbors. They would create employment for thousands of people, much more wholesome and profitable, in a pecuniary and moral point of view, than that of spinning or weaving cotton, so unfavorable to health and morals; while the resources and physical strength of the nation would be more augmented by such improvements, than ever they have been, or can be, by overdriven manufactories, or commerce too much extended.

These bring a temporary, but very uncertain gain; but, by the improvement of moss, and other waste lands, in Scotland alone, the arable and productive part of this kingdom may be more than tripled; the food of mankind quadrupled; the population proportionally increased; and the climate mended.

An increase of population has ever been justly considered as the strength and best security of any state. That must be more than ever desirable and necessary, when our colonial system has been so wonderfully enlarged, and when we may be considered as at war, unaided, with Europe—and but little better with America—headed by the most consummate and successful general, and most ambitious and unprincipled tyrant, of modern times.

But, inadequate as our population certainly is, to the supply of such immensely extended colonies, and to the force with which we are threatened, it is much more than can be supplied with food, either raised within the island, or that can be imported from our own colonies. We must pay annually, even in ordinary seasons, five, sometimes seven or eight millions of our guineas, already too scanty for our extended commerce, to procure grain to support the present population; while millions of our acres, capable of raising that grain, are neglected, and many thousands of our inhabitants, who might improve that land, are buried alive, in unwholesome factories, to the ruin of their health, and contamination of their morals.

This may do in ordinary seasons, and while it is possible to procure from our enemies the grain which we need; at least the injury it does, is slow and not immediately perceived: but if a great failure of the crop should happen when we are at war with all Europe, and denied intercourse with America, we must either encounter famine, or lie at the mercy of our most inveterate and unprincipled enemies, for the staff of life. And who knows but they might demand from us, the same sacrifice that was exacted from Esau; compel us to barter our naval superiority—the birth-right which we inherited from our fathers, and of which we are so justly proud—for a morsel of pottage!

These evils, I hope and trust, kind heaven, which has so long held this happy island under its protection, will continue to avert. But they must be mentally blind indeed, who do not perceive the dangerous consequences of paying away so many millions of our guineas for grain, annually, at a time when our manufactures, and colonial produce, are excluded from the continents of Europe and America; and they certainly want a prudent and necessary foresight, who do not perceive the extreme danger to which we would, under existing circumstances, be exposed by any material failure of a crop.

Every improvement in agriculture has a happy tendency to secure us against these evils. But that of reclaiming mosses and wastes, as far as they are capable of improvement, would not only raise food for the present inhabitants, but for thousands, and hundreds of thousands more, which would in that case be procreated and brought into existence.

The quantity of manure that might be made from moss, for the arable land, is also a matter of great importance. But as this paper has already been too much extended, I must leave that subject, and a particular account of the *modus operandi* pursued by some of the most successful improvers of moss, to be inserted, if you think proper, in some subsequent number.

Meantime, I am, &c.

WILLIAM AITON.

From the Farmer and Gardener.

CULTURE OF THE MORUS MULTICAULIS, SILK WORMS, &c.

Mr. Roberts—The following paper on the subject of *morus multicaulis*, silk, &c., has been drawn up in consequence of the numerous applications made to me for information on the various branches of the subject; and for the purpose of correcting numerous errors that continually pervade the public press. Every word I write is founded upon my own experience. Another object in drawing up this paper, is to endeavor to rescue the credit of many valuable improvements in the business, which have been filched from the author of them.

There can be no doubt with those who have made themselves acquainted with the qualities of the various varieties of the mulberry, that the new Chinese *species*, or *morus multicaulis*, is the best for feeding silkworms. I estimate the comparative value of the morus multicaulis and the best white or Italian variety, as one to two; that is, I consider the morus multicaulis worth one hundred per cent. more than the white Italian. It saves nine-tenths of the labor in gathering the leaves, on account of their being at least ten times the size of those of the white. One pound of morus multicaulis leaves contains one-third more nutritive matter than a pound of the best white mulberry leaves; the reason of this being, there is very little woody fibre in the morus multicaulis leaves, and in the best white there is a very large portion, all which passes off in the form of excrement. The morus multicaulis affords leaves, and is not injured by the loss of them, the first season—all they require is a few to be left on the tops and ends of the branches. The white requires to be 3 or 4 years old before it can be used. The morus multicaulis is perfectly hardy, when grown on its own peculiar and natural soil, which is light, dry, and not over rich. On low rich soils, their growth is protracted to so late a season that they do not ripen their wood, and of course they are killed to the ground in winter. I have uniformly grown them

on high dry rather sandy soil, and never lost a branch or a bud; while others, who planted them on low alluvial rich soils, have lost them every winter. Mr. Robert Sinclair, in the Farmer of the 8th of August, inst, gives the result of an experiment he tried last year in cultivating them on high ground, in which they proved perfectly hardy; whereas heretofore when he planted them on low rich soil, they had been killed down by the frost of winter. Mr. Sinclair forgot to state that this was an *old practice* with me, and that I had frequently remonstrated with him for planting them in this low rich ground. He states that it was an "experiment" leaving the public to infer that it originated with him; whereas he was well aware that I had long practised it with invariable success, and had frequently recommended it to him, as well as to the public.

The morus multicaulis is propagated with more facility than any other kind. A piece of last year's growth an inch long, with only one bud, is all that is wanted to make a tree 5 or 6 feet high in one season. Make a hot bed in the ordinary way, as for raising cabbage plants, about the 1st to the middle of March; take the limbs that grew last year, cut them in pieces, with one bud on each piece, stick them into the bed in a slanting position, inclining to the north with the bud on the south side, its point just even with the surface of the soil; water them every evening, shade them when the sun is powerful in the middle of the day, and about the 1st of May they will be abont the size of cabbage plants, and ready to be set out where they are to grow; take them up as you do cabbage plants, set them out, water them freely for a few days, put a cabbage leaf or any such thing over them for a day or two to shade them, and they will grow off, and form fine trees 4 to 6 feet high the same season. This has always been my method of propagating them, and the plan originated with me. I was surprised to find last year, Mr. Sinclair endeavored to obtain the credit of suggesting this method of propagating morus multicaulis trees. He published in the Farmer and Gardener and other papers that he had succeeded in propagating them from single buds, and in this, as in the case above noticed, leaving the public to infer that he was the discoverer of the new method, when the fact is that ***I instructed him in the whole process.*** It is to me a matter of no moment in a pecuniary point of view, for my only object is and has been the furtherance of my country's interest in this respect; but it is rather mortifying, after laborious experiments and study —working for nothing and finding one's self, to have even the *credit* of our labors and discoveries filched from us.

In extending the mulberry orchard, take the whole top of the tree raised as above last year, cut off three or four inches from the ground, cut it up and plant the cuttings as above. The old root will send up half a dozen shoots, each of which will be as large as the whole tree was before it was cut down, and thus furnish more cuttings for the next year.

If the trees are raised on the proper soil, they will want no protection; if they are growing on low rich, or any low soil, they must be taken up in the fall, and "laid by the heels," either in a dry cellar or a shed open to the south. Lay them in a slanting position, close together, burying the roots perfectly in the ground.

If cuttings are desired to be kept through the winter, the best way is to dig a hole in some high dry place and bury them a foot or two in the ground. They may be kept also by being wrapped in green live moss from the swamps, and placed in an ordinary cellar. I have kept them all winter in my office by tying them in a close bundle and setting the butt ends in a basin of water so that the water covered about an inch of the ends. In this way they were not only preserved, but the buds began to grow too soon, from the warmth of the office.

Many persons recommend that the trees be cut down to within three inches of the ground, and the stumps covered to protect them, and feeding silkworms from the leaves of the young shoots. This is bad practice, and should not be followed —besides, it is not necessary, as, properly cultivated in a proper soil, as above stated, they want no protection. The objections to the practice are— the lateness of the season before the shoots will be large enough to afford a sufficient supply of leaves; and the succulence of the leaves from these young shoots. Both these objections render the practice inadmissable—your worms will starve to death before the shoots will afford leaves; and if you *can* keep them alive till leaves are produced, you will be very apt to lose them by disease, produced from feeding them with the too succulent leaves.

The morus multicaulis cannot be propagated to any extent from seed, simply because the trees produce so little that it will not pay for saving even if it sold at its weight in diamonds. The whole of the seed that has been sold for some years in this country, as morus multicaulis seed, was spurious, and I was so well aware of its spurious character that I have never bought or used a grain of it. I have used all my influence to prevent my friends and correspondents from being imposed upon by it; but unfortunately, self-experience is the only school for some people. I assert that no genuine morus multicaulis seed can be offered for sale here or elsewhere; and time will prove the truth of the assertion. I would not be uncharitable, but I verily believe that the idea that the morus multicaulis was a variety and not a species, and therefore that its seed would not produce its like, originated with those who were engaged in speculating in "morus multicaulis seed," and that its object was to cover the imposition of other seed upon the public for morus multicaulis seed. As it produced all sorts of mulberry trees, except morus multicaulis, it was desirable to attempt an excuse. And this was resorted to—lame and impotent as it is. I assert positively that it is a distinct species, that its seed produces its like exactly, as I can at any time satisfy any person, having trees raised from seed by himself. But it is of little importance whether the seed will produce the true morus multicaulis or not, as the seed cannot be obtained. I have the oldest tree in America, and it never produces good seed enough to make it an object worthy of notice; besides the trouble of keeping weeds down, &c. and the ease with which it is multiplied by cuttings, would prevent my using seed if ever so abundant and cheap.

There are many mulberry trees in this country called morus multicaulis, that are not the true kind. I have seen hundreds of such. They are the broad leaved variety of the white mulberry.

The morus multicaulis differs entirely from all others in several respects. Its specific name points out one of its peculiar characters, viz. *multicaulis*. While all others form single bodied trees, the multicaulis continues sending up new stalks from the crown of the root, and thus growing in clusters of bushes like the lilac, hazle, &c.—hence the name multicaulis, *many stalked*. The leaves are not only larger than any other kind, but their form is different from all others. The leaf is invariably *bowled*, so much so that it is impossible to spread it out flat without tearing the sides. This form is not seen very conspiculously in the young seedling, but as soon as the plants get a foot or two high and the leaves attain half their proper size, it is very distinct. The leaves are so large that they always hang pendulous, when full grown, and somewhat folded length-wise. These peculiarities will enable any one to distinguish the true tree from all others.

Let me advise purchasers of multicaulis trees to be cautious in receiving budded or grafted trees. They are worth nothing but for cuttings, their roots are of no use; while those on their own roots have the advantage of the roots to furnish new supplies of cuttings from year to year. Budded and grafted trees also may be lost altogether by the perishing of the tops in transportation; while if the whole top of a tree on its own roots perishes, only the cuttings of one year will be lost, the root will live and furnish abundance of cuttings for another year.

No other preparation of the ground is necessary than turning it over once to destroy grass and weeds, and then keeping the ground clean during their growth. The poorest ground need not be manured, though it would be best if in tolerable condition. Any ground that would produce ten bushels of corn to the acre, will be good enough for them. The fall season is the best time to obtain the trees, and the spring the best to plant them out. I would recommend them being obtained in the fall and kept "laid by the heels" till April, and then set in their proper places. The reason they ought to be obtained in the fall is, that they may be ready to set out at the proper season in the spring; whereas, if not obtained till spring, various accidents and delays may cause them to come too late, and they may thus be lost or retarded in their growth, so that the next winter may injure them.

Silkworms—A radical error of our countrymen in commencing the culture of silk, is their beginning at the wrong end. Almost all of them obtain a supply of silkworm eggs first, and then go in search of mulberry leaves to feed the young worms with. Because the forest is full of the native mulberry, and the fields studded with white mulberry trees, they think they can readily obtain a sufficient supply of leaves for two or three hundred thousand worms "to begin with;" and so they can for the first two or three weeks, but during the 3d, 4th and 5th week, when the worms eat almost their own weight of leaf every day, and when it is absolutely necessary to the full accomplishment of their object that they should have a full supply of fresh leaves continually before them, the supply fails; the labor of gathering a sufficient quantity from trees scattered through the woods and almost inaccessible from their height, is found to be insurmountable, and the worms are stinted in their food, dwindle along 3 or 4 weeks more half-starved, and at last spin an imperfect cocoon that is good for nothing. Many persons do worse than this. When the worms enter their fourth stage and consume a full quantity of leaf, they are abandoned altogether and starve to death. Millions upon millions of these interesting insects have perished in this way within my own knowledge. Some years since I visited a person a few miles from the city, who had been boasting of his large number of worms a week or two previously. I found them scattered over the floor, walls and ceiling of the large room, wandering about in search of food, and half famished. He said he found he could not get leaves to feed a tenth part of them, and had abandoned them in despair. There must have been a million at least. They all perished. He never could have obtained leaves enough to feed 50,000 worms from all the trees within his reach.

The proper way is to secure a convenient mulberry orchard. It should be as near the laboratory as possible, and should be sufficiently extensive to supply twice the number of worms you calculate on keeping, as a security against accidents, &c. After you have secured the mulberry trees then obtain the silkworms. If you have no experience with them begin with ten thousand; and the next year increase the number. Ten thousand worms will be enough to learn you how to manage a larger number, and they will furnish cocoons enough for you to learn to reel silk with, and a sufficient supply of eggs for another year. Use all these cocoons to learn to reel with—don't try to make the finer qualities of silk, but learn to reel any thing. The object is to "get the use of your tools." Learn to catch the fibre and join it to the thread expeditiously; adapt your sense of touch in the fingers to the extremely fine fibre that you may be able to *feel it;* enable yourself to understand the proper temperature of the water for dissolving the gum of the cocoons, that you may be able to make the fibre run or unwind well. All these little details, simple when understood, and easily acquired, but absolutely necessary to a good reeler, are to be learned only from practice—patient, persevering practice, unchecked by feelings of interest or fear of losing cocoons. But a few weeks, even a few days, are sufficient for the accomplishment of the object.

It is not my purpose now to give instructions in the whole art of reeling, or managing silkworms; that object has been fully accomplished in various publications in the Farmer, in pamphlets, and books. The present paper is merely intended to supply deficiencies in other publications, to call attention to some prominent points, and to correct certain errors.

Let me urge attention to cleanliness in the laboratory, essential to the comfort and health of the proprietor and his assistants, as well as to the success of his business. Always keep a box or some other vessel of chloride of lime in the room with the worms. A jar with a pound or two of it standing open, will keep the air in the room sweet, and thus protect the worms from disease. If from inattention your worms become affected with the *tripes*,* lose not a moment in sprinkling the floor

* *The tripes* is a disease among silk worms analagous to the plague in the human family. It is caused by foul air, in the room, generally in damp weather.

with a solution of chloride of lime, and set saucers of it in various places. It will speedily cure those that are sick, and prevent any further extension of the disease.

This remedy for the tripes is also my own discovery. It was published in the American Farmer, and the Farmer was regularly received by several members of the society of Agricultural Science in Paris; notwithstanding which, many months after its publication in the Farmer, a paper was read before that society giving the details of the important discovery by a citizen of France, that chloride of lime was a sure remedy for the *tripes*. However, it matters little to the public who is entitled to the credit of so important a discovery, so long as that public has the advantage of it. But I would suggest that there will be little encouragement to laborers in the fields of scientific discovery, if they are to derive *neither* interest nor credit from the results. The public is so prone to forgetfulness on this subject, that most discoverers now-a-days resort to patents to enforce their claims, and if the public will not be voluntarily just, it seems no more than proper that some such process should be adopted.

In their anxiety for improvements, those who enter upon the silk business are too apt to adopt useless if not injurious innovation. There are many parts of the French and Italian practice that may well be improved, some of which are useless and some few ridiculously so. But we must not infer thence that their whole practice is wrong, and that we are capable of substituting an entire new one. Among all our experimenters we find no one that tries the brush or twigs universally used by the French and Italians for the worms to climb and spin their cocoons on. We are continually inventing new plans for this part of the work, such as building frames, &c. But it seems to me that the simple brush that has answered the purpose for hundreds of years in other parts of the world, might be safely adopted in this. I have escaped this symptom of the mania so far as only to propose the use of *broom-corn brush*, as being more convenient and simple than the brush of the French. It answers the purpose admirably with me.

Again, our people are endeavoring to make themselves and the public believe that we can produce successive crops of silkworms in the same season, so that the work of producing cocoons may be extended through the whole summer instead of being confined to about six weeks in May and June. If this could have been profitably done, the French and Italians would have long since found it out; but we are not left with the conjectural uncertainty of an *if*—it was fairly tried years ago, and resulted, as any body but one gifted with the sanguine mind of a new beginner might have known, in an unprofitable expenditure of time and labor. The eggs may be forced to hatch the same season they are produced; but it is unnatural, and they hatch so irregularly that a profitable result cannot be obtained.*

I see by the newspapers that one of our new beginners has discovered and taken under his care a new species of silkworm, an American silkworm —whose cocoon is some eight or ten times as heavy as that of the common—and from which he expects to produce wonderful results. Many years since many of these American silkworms were sent to me from the south and the north—from the east and the west; and I was then, as he is now, elated at the idea of introducing this new and valuable improvement in the silk business; but the worms would not feed kindly, the moths flew away as soon as they escaped the cocoons, and the cocoons could not be reeled. Worse than that, even when reeled the silk was coarse and harsh. Nothing that I could think of would dissolve the gum of the cocoons, even with twenty-four hours soaking. Of course I let the moths fly away. There are several varieties of worms that make cocoons in this country, but it does not follow that the fibre of those cocoons is as valuable as that of the true silk worm.

The best and simplest hurdle for the accommodation of silkworms is that suggested in my treatise published in 1830 in the American Farmer, and in pamphlet form, and which I have always used when I had worms. It is made as follows—a frame 5 or 6 feet long and 3 wide, made of plank 2 inches wide and 1½ thick; like the outside of a window-sash; make holes through both side and end pieces with a brad awl about three-eighths of an inch apart; pass strong twine through the holes lengthwise and then crosswise, and thus form a net work bottom for the hurdle. This will allow the dung of the worms to fall through upon a similar frame with a paper bottom that should be placed under it. It saves a good deal of labor in cleaning off the litter, and permits air to pass up among the worms and leaves.

I perceive that this hurdle is also claimed by our ingenious countrymen at the east, as of their *invention*. Pity that their ingenuousness did not equal their ingenuity.

It is a common error to suppose that the young worms require young and tender leaves to feed on. They, on the contrary, eat the most mature leaf with as much greediness when a day old as they do when full grown. The French recommend cutting the leaves into small pieces, and have a knife for this pupose; this practice I found injudicious, as the worms press upon the mass and make as it were a carpet of it, and much leaf is lost. I prefer laying on the leaves whole—the worms will speedily cut them up for themselves. This practice is only equalled by the French recommendation, to separate the male and female moths after having been together six hours in the act of copulation. Following their directions, for in those times I had no other guide than the French books,

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The foul air proceeds from putrifying vegetable substances, such as stale leaves, &c. The first sympton shows itself in the worms ceasing to eat, throwing their heads back, and becoming of a black color. They soon turn quite black and die in an hour or two, and mortify in another hour, when they smell very badly. The disease will spread over the largest establishment in 24 hours, if not suppressed by the free use of chloride of lime.

* Since the above was written I have learned that some gentlemen in New Jersey are enabled to prolong the season of feeding worms, by keeping the eggs in an ice house, and bringing out portions as they want them through the summer. If put into an ice house immediately after they are produced, and kept there, this plan may answer the purpose; but if put there on the approach of warm weather in the spring they will hatch, even in the midst of the ice, as I know from experience.

I separated all my moths after six hours, and to my mortification one half my eggs were *not fecundated*. After that, I allowed the moths to take their own course in this affair, and all my eggs were thenceforth good.

In conclusion, I would recommend those who desire to enter upon the silk business, in the first place to secure a supply of morus multicaulis trees, and establish an orchard; then go ahead—leaving experiments and improvements upon the well known and successful methods and furniture to be suggested by experience as they progress.

GIDEON B. SMITH.

TO TAKE OUT WIRE GRASS.

In Hillyard's 'Practical Farming' there are the following directions for getting rid of the very troublesome weed called *couch* or *twitch grass* in England, and well known as *wire grass* in lower Virginia.

"When land has become very full of twitch, it is a good plan to half-plough it—that is, turning over one furrow, and then another opposite, to meet it; this done in November will check the growth of the twitch during the winter. The land when ploughed in a contrary direction, early in the spring, will lie in heaps, and thus become quite dry, when the twitch may easily be got out, and a good turnip fallow made. A sandy soil is the most liable to be overrun with it,; but it is one from which it is easily extirpated."

From the Turf Register.

TAMING WILD HORSES—AGAIN!

Mount Farm, Clinton County, Ill.
June 10, 1837.

Mr. Editor:—In your March number, at page 316, you have made some remarks on an article of mine on the subject which is at the head of this communication, calculated to inspire doubts as to the truth of my statements, although you vouch for the respectability of my character. Your correspondent 'G.' in the same number, also seems to question their accuracy, and not only those of mine, but also those of previous correspondents on the same interesting subject. A desire is also expressed, both by yourself and him, that pains should be taken to obtain the *secret* by which *Mount* was enabled to conquer, in so short a time, that most vicious animal. Since the receipt of that number of the Magazine, I have been to Kaskaskia, my former residence, and made more particular inquiries into the case reported to you, and of which I was an eye-witness, and have held conversations with those who are in possession of the secret. They all concur in my account of it, and further assure me that they are in the constant habit of using the means with which Mount operated, and have never failed of success, no matter how devilish the horses were. *I am also in possession of the secret*, and can teach any man acquainted with horses to subdue and render tractable the most ungovernable, in one or two hours. *About this there is no mistake.* By the same means, the most *baulky* horse can be made to pull as true as the best dray horse in your city, and oxen can be broke to the yoke, and to pull without flinching, in an hour or more.

Some further facts in relation to 'the roan' on which Mount operated at Kaskaskia were given to me, in substance thus: that the next day, in taking him from the wagon, the driver went behind his legs, unhitched the traces, gave him a kick, and he trotted off to the stable like an old stage horse; and further, when he left town, 'Roan' was turned loose and trotted after the wagon, never offering to run away, and this, a horse raised in the woods, and but for a few hours under the dominion of man! All this, I admit, is a severe draft upon credulity, but it is as true as that *control* has been given to us over the whole brute creation.

I have ascertained to my perfect satisfaction, that the means used have no injurious effects whatever, on the spirits of the horse; upon his disposition they act like a charm, and seem to attach him to the person who administers them.

A gentleman who has practised the art assured me that he caught, for his little sister, a wild Point horse, and in one week had so completely gentled him that she rode him every where with the most perfect safety. That the means used, properly administered, will produce the effects spoke of, there is no more doubt than that you have an existence.

SIGMA.

Remarks by the Editor of the Turf Register.

The subject of the above article from 'Sigma' becomes more and more interesting every day. The facts stated by various persons are so strange, so "out of the usual course of things" that "Sigma" himself need not wonder that many people continue to doubt, though they are affirmed to by persons ever so respectable. The facts asserted by "Sigma" and various other respectable gentlemen, are neither more nor less than what are almost universally believed to be impossibilities. If we were to assert that we could take a wild horse, and in one hour so completely change his disposition and habits as to render him docile and tractable, so that he can be ridden by any person or driven in a carriage, there are few people in the world that would believe us; and yet this is simply the very fact asserted by "Sigma," and which we *now* candidly believe can be done. We did not intend to cast a shadow of doubt on the statement of "Sigma," nor do we believe that 'G,' did. We know the character of "Sigma" too well to doubt what he asserted as a fact within his own knowledge.

The editor of the Turf Register has now the pleasure of announcing that he *is in possession of the secret;* it has, however, been acquired at too late a day for a trial before the present number goes to press. He is not at liberty at present to publish it, nor communicate it to others, but hopes, after a fair trial shall have been made of it, to obtain permission for its publication. Not having tried the experiment, we cannot speak practically of its results; but we are led to believe, from recollections of analogous things and circumstances, that not only horses may be rendered docile, but many, if not all other animals may be domesticated and tamed, or stripped of their wild ferocious propensities by the application of this singular practice. We would remark to 'G.' and several others who have suggested what they supposed was the secret, that nothing mentioned by any them forms any part of it. There is no stopping the ears with wool, nor applying the effluvium from the arm pits to the nose of the horse, nor severe

flagellation, nothing of the kind nor any thing like them in "*the secret.*" By the way, we must invent a name for it, for it will make a noise in the world yet.

For the Farmers' Register.

LOSS CAUSED BY STRIPPING CORN FODDER.

In your number for August, you recommended to the farmers, who had not satisfied themselves of the mischief done by stripping Indian corn of its green leaves, to test it by experiment. This I have heretofore done, and have no doubt upon the subject. I now gather only a few blades, which I find useful as a change of food for my horses. I have, from some observation, formed the opinion, that where corn has an early vigorous growth, in a propitious season, that the injury done by stripping, is not so serious; but retarded in its growth, by a cool summer, or a dry season, I believe that more loss is sustained than would pay the taxes in Maryland. I was from home, from the last of July, till the tenth of September, in upper Virginia, and I never before experienced the weather so warm in the mountain region. I learned, with surprise, upon my return, there had been a prevalence of easterly winds, and an unusual cool season here. I found, in my neighborhood, stripping the corn in active progress, and by consequence, the shuck and the stalk soon became brown and dry; the tops and blades of mine, which were permitted to stand, retained some verdure, till the occurrence of a sharp frost, on the 14th of this month; they are now dry, but the stalk is still green in a degree, which manifests a continuance of circulation, and I apprehend will contribute to the maturation of the ear. The evidence against my system is, that no one has adopted it. It is hard to part with old habits; when I was young, I knew an aged farmer who recollected the introduction of the wheat fan; and he told me that its progress was slow.

I sow no wheat in my corn fields, and my horses, cattle, and sheep, after the corn is gathered, find in them ample provision till January. Many farmers are deterred from the fallow system, from the apprehension of its cost and expense. I believe if the profit, cost, and labor, were accurately estimated, it would be in favor of the fallow. My corn fields receive their full cultivation before harvest, as I find the time which I formerly devoted to gathering fodder, more usefully employed in marling and manuring my fallow. Formerly, in a hot season, when the grass had taken possession of my corn fields, I have been engaged thirty days in sowing wheat. I can now accomplish it in ten, and can select the most favorable time, and the loss sustained by treading down the corn, would, in sowing wheat, form no inconsiderable item in the account of profit and loss.

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Queen Ann's County, Md. 19th Oct. 1837.

From the New Jersey Banner.

MARL FOR PEACH TREES.

A subscriber informs us, and wishes the fact made public, that marl, put round the trunks of peach trees, a bushel and a half to each tree, protects them from the attacks of worms, preserves the trees in health, promotes their longevity, promotes the growth of the fruit to almost double its size, and greatly increases the richness of its flavor.

From the Richmond Enquirer.

PRODUCT OF SPRING WHEAT.

To the Editor. BREMO, Sept. 4, 1837.

Observing several notices in the 'Enquirer' of experiments with the Italian (Florence) spring wheat, I send you the results of the seeding of several parcels, under different circumstances, by which the agricultural community may judge of the value of this new species of the most valuable of our grain crops.

From three bushels of this wheat, after tobacco, upon James River bottom, one-half of the quantity sown in December, and the other half the first week in March, I have thrashed and measured forty bushels of merchantable wheat. The quality of the grain is inferior to that sown.

From eight bushels of the same, sown on thin high land, I got only twenty-seven bushels. This parcel was seeded in the latter part of February. Of the seeding on the bottom land, the produce of that sown in December was better than that in March—this latter being injured somewhat by the rust, which the other escaped.

JOHN H. COCKE.

From the Journal of Science and Arts.

ROTTING OF TIMBER IN CERTAIN SITUATIONS.

In the year 1801, I built a ware-house on my lot in Union street in Schenectady. The cellar was dug about four feet deep, and the stone wall a foot or two deeper. I left no opening in the walls for door or window. The floor beams were of excellent pitch pine timber, of twelve by twelve inches, slit, and were six by twelve inches when placed in the wall, and about eighteen inches above the ground. I laid a floor of three inch oak plank, loose, neither jointed nor nailed, although they were square-edge, and lay close to each other. Five years thereafter, I observed a jostling in a place in the floor, and raised one of the planks to learn the cause, and found one of the six by twelve inch beams rotted off and fallen on the bottom of the cellar. The plank was rotten below, except about an inch sound on the upper side. I lifted the whole floor, found most of the planks rotten, except a shell on the top; and the timbers were rotten, and so decayed, that I took them out and put in oak, after making windows and a door in opposite sides of the wall. I thought the depth of the cellar would have prevented injury to the timber, but found it the cause of the destruction, as fine shavings and slivers lying on the bottom of the cellar, were perfectly sound, while the timbers, were beautifully ornamented with curtains of white mould, hanging in festoons, nearly to the depth of the cellar, as white as snow, very thick, and appeared like bleached muslin.

In the year 1817, I took down an old kitchen on the same lot. The floor had lain on saplings of about 6 by 8 inches, such as are used for scaffold poles. They were bedded in the ground, so that the pine floor came next the ground, and excluded air. They had lain there from 1794, and both the

timbers and flooring were very little injured by rot.

I concluded, that a free circulation of air must be allowed, or air must be entirely excluded, to save timber from decay.

It has been found, that when posts are set in the ground and cased with boards for better appearance, the confined air destroys them. Even red cedar, which lasts an age when set open, if cased, which is often done for ornament in gate posts, decays as soon as any other wood, by the confined air.

For the Farmers' Register.

LEAVES AND GYPSUM, AS MANURE FOR TOBACCO.—NATURAL ADVANTAGES OF PART OF MECKLENBURG.

Bluestone, Mecklenburg,
October 18th, 1837.

I promised last spring, to report the result of an experiment, in manuring with leaves for tobacco. It has not been, altogether, as successful as I expected; but has not been so much a failure, as to discourage future efforts in that way. The scraping from the wood-pile proved much less efficient than the leaves. I am encouraged by a remark made by you, in the last 'Register,' to hope that what my tobacco, made on land manured with leaves, may want in size, will be made up in richness and flavor. I used plaster, freely, in April, on young clover, seeded in March, without visible effect. But that used on tobacco, was perceptible in eight days, and on the tenth day was so obvious, that a visiter at my house pointed out the unplastered row, instantaneously, without any guide except the size and complexion of the plants. This was new land, with the first crop. The crops of corn and tobacco in this neighborhood are very good. The crop of wheat, though not very abundant, was first-rate in quality.

While I am writing, I will call your attention to some of the features of this region. I never saw any country more inviting to capitalists. There are four navigable rivers coming together, in five miles' compass. The same compass embraces Hico and Tally's falls, affording most splendid water power, and sites for mills and manufactories, besides four or five creeks immediately below, and one just above the first mingling of the Dan and Staunton, at Abbeville, a deserted town, and a beautiful location for a town. While the rail road mania raged so furiously, it is strange that nobody ever thought of constructing one from Abbeville to Farmville, a distance of about fifty miles, on a continuous ridge, unbroken by a single ravine, and on which, might be constructed a road without excavation or embankment. There is said to be another ridge, which strikes the Appomattox still lower down, that seems equally well adapted to such a purpose. There are three large manufacturing mills now operating within three or four miles of Abbeville, and water power for an almost countless number of manufactories. The lands on both sides of the Dan and Staunton, from the first junction or thoroughfare to their final confluence, and as far below as I know them, are very productive, but not at all improved. I think if Mr. Ruffin and Professor Rogers could each spend a few days in this region, they might develope resources of great variety and value. Without pretending to be a judge, I think that an immense portion of the capital and enterprise of the state of Virginia might find profitable employment within these ten miles square, embracing the mouths of Hico, Banister, Dan and Staunton, and the town of Clarksville. I drop these hints, Mr. Editor, with a view to improve upon them at some future day, or to awaken the attention of those better qualified to examine into such matters.

A. C. MORTON.

For the Farmers' Register.

EXPERIMENT OF THE PRODUCT OF TWIN CORN.

To JAMES M. GARNETT, Esq.

Dear Sir—The parcel of twin corn you had the kindness to send me last spring, came safely to hand; and I adopt the mode of thanking you through the 'Register,' for the favor, and of stating, at the same time, the result of my experiment. The corn, with the exception of a few grains given to two of my neighbors, was planted about the 8th or 10th of April, in good ground, which had been bedded for tobacco, the beds being about three feet two inches wide, which was evidently too narrow to give the corn its best chance of fruitfulness. It was hoed twice, superficially, and ploughed once only, throwing the furrow-slice to the corn. I have just harvested the crop, and from a small fraction less than the sixteenth of an acre, containing 354 stalks, harvested 739 ears, or four and a half bushels of corn, four bushels being sound, merchantable corn, and half a bushel, *nubbins*. One remarkable stalk, including suckers, produced ten ears, viz: the main stalk four, two suckers, each two ears; and two others, each one ear. This stalk I have hung up in my porch, to convince the incredulous. The two suckers that produced two ears each, grew there as ears ordinarily grow on the corn stalks—the other two, had each an ear on top. One stalk produced six ears—six produced four each, and forty-eight produced three each. Forty-four good ears were gathered from the suckers, and some nubbins. This statement includes all the ears harvested. The corn-plants that were thinned out, were transplanted, and the stalks generally yielded two or three ears each; but as this soon partly fell a prey to a mischievous hog, I cannot give the exact result.

Dr. Paul C. Venable, and Dr. H. L. Jeffries, to each of whom I gave a few grains, were very much pleased with the corn through the summer; but I have not seen them since it was gathered. The twin corn was two or three weeks earlier than the common crop of this neighborhood, and I think it promises to be a great acquisition. Every gentleman who has seen it growing, was highly pleased with it, and bespoke an ear to plant. I have thus, sir, given the result of an experiment, which proves highly satisfactory to me, and which, I hope, will prove useful to this region of country.

Your obliged, humble servant,
A. C. MORTON.

P.S.—A pinching drought, about the time the ear began to fill, lessened the crop perhaps a fourth.

QUERCITRON BARK.

To the Editor of the Farmers' Register.

In the September number of the 'Farmers' Register,' there is an extract from the 'Journal of the American Institute,' on the use and value of the quercitron bark. The notice would have been complete, if any direction had been given to distinguish the quercitron from other species, which go under the general name of *black* or *red* oaks. In common parlance, there are three species confounded together, under this vague denomination: namely, the red oak, (*quercus rubra*); the turkey oak, (*Q. falcata*); and the quercitron, (*Q. tinctoria.*) A practised eye may readily discern the difference; but as every farmer is not a botanist, so it is not to be supposed that he can, with certainty, pronounce upon the species in question. The bark is generally regarded as the best criterion for judging of the kind, but the leaf offers a much safer one. The quercitron has the largest leaf of any of the tribe: it is oblong, slightly lobed, and covered with down on the under side. The red oak has a glossy leaf, of a strong texture, deeply lobed and attached by a long leaf-stalk. The leaf of the turkey oak resembles the track of a turkey, and from thence, in all probability, acquired the name. These three species abound in our forests, though the two former predominate; and they are, I believe, used without distinction, for tan bark. The quercitron, however, is of very little value for tanning, while for dyeing, and prepared in the mode described in the extract alluded to, it commands a good price, and is always in demand for exportation. Previous to the present embarrassments, it was worth $40 per ton. The price is now something less; but still it is in request in the northern cities, as it answers the purpose of making remittances to England. These facts I had from a dealer in the article, whom I lately met with in Maryland. It is matter of regret, that our tanners do not separate this from the other kinds in their purchases, and prepare it for market in the manner recommended. As things are managed in Virginia, a great difference is made in value, between the Spanish oak and red oak barks. This is not properly owing to any inferiority in the latter, but rather to its mixture with the black oak, which is almost worthless as an agent in tanning. The quercitron, when prepared for dyeing, yields a handsome profit; and I am informed, that this process is a regular branch of business, at most of the large tanneries, to the north of the Potomac. As well as I recollect, it takes about three cords, after being chipped and ground, to make a ton. The profit, therefore, would be something like a hundred per cent.; for the price per cord never exceeds $4 delivered, and is often less.

P.

Goochland, Oct. 9.

From the British Farmer's Magazine.

OPINIONS OF GYPSUM, AND ITS EFFECTS AS A MANURE IN ENGLAND.

Sir—The subject of gypsum as a top-dressing for clover, appears to have sustained a revival, if I may be allowed the expression, in some of our agricultural districts, particularly the *East Anglian;* from whence there has lately issued, I will not say a deputation, but a *visitation* to some of the counties where it is now in use, and, if report speaks true, in deservedly high repute. One gentleman. a neighbor of mine, brought with him from Hants, a small quantity, which, on his return, he applied to a clover layer; soil, light and dry; and the effect was soon very apparent in the darker green exhibited by the part so dressed. I perfectly well remember the subject of gypsum being brought forward at the Holkham sheep-shearing, in 1818, by the late Mr. Benjamin Holdich, (afterwards editor of the 'Farmer's Journal') who detailed many interesting particulars of the use of it in America, twenty years previous to that period. The following letter was addressed to him by a friend of his in the United States.

"I do not recollect" says the writer, "what was the state of agriculture when you left the United States; whether plaster of paris" (gypsum) "was in general use or not. Certain it is, that article has changed the whole face of the country since our first landing in 1793. All the eastern, or maritime, part of this state was in a great measure exhausted, and worth comparatively little. About twelve years ago, the best lands in Chester and Montgomery counties could be bought from £10 to £12 per acre; but such has been the effect of this stone, where pulverized and sown, that the same lands have been sold at £50, £60, and £70 per acre, by the farm, with the buildings thereon. During the late war, this article could not be brought from Canada, which set our own people of the west to explore the country about the smaller lakes in the New York state. Thomas Cooper our countryman, formerly Councellor, but now Judge Cooper, from Manchester, about seven years ago visited the Falls of Niagara, and being skilled in mineralogy, he carefully examined the countries about the great lakes, and pronounced that he had discoved genuine plaster, or gypsum, and exhibited specimens on his return. When the country, by the war, was deprived of this article from the usual source, the account of Mr. Cooper was remembered, and in a short time they discovered immense beds of it about the small lakes of New York, particularly the Cayuga and Seneca lakes, not far from the head waters of the east branch of the Susquehannah. Thousands of tons were quickly transported down that great river, and distributed, by means of its tributary streams and its communication with the Chesapeake, to the whole eastern parts of Pennsylvania, and to all Delaware and Maryland, and by the Potomac to Washington and Virginia. The advantages are incalculable; enriching and fertilizing the whole country in an astonishing manner—millions of acres, which never could have had the benefit of this plaster from Canada, on account of the expense, will now be restored to better condition than when originally cleared, which would otherwise have been good for almost nothing."—*Lebanon, May* 1, 1817.

In 1819 the first trial of it took place at Holkham, under the direction of Mr. Blaikie and Mr. Holdich, on part of a field of sainfoin, from which it was thought full one third more had been mown than on the part undressed. The powder was applied by the drill, and its effects might be seen to an inch, even at a great distance. Mr. Coke used six bushels an acre. He procured the gypsum from Derbyshire, delivered at Wells, (the adjoin-

ing port), at 30 shillings a ton. Mr. Holdich took considerable pains on that occasion to impart such information as he possessed respecting its use and properties, and, among other things, stated the necessity of reducing the stone to powder *without baking*, as it had been ascertained that the action of fire was decidedly injurious to the gypsum as a manure.* He observed that there were several varieties of gypsum, but there is little difference in their effect as manure. The *Newark* he reckoned as good as any. "It is," observes Mr. Holdich, "most immediately serviceable on land of a dry, gravelly, or sandy nature, and is most exceedingly useful to an old sainfoin layer, as has been proved at Holkham Where clover fails, having formerly succeeded, it will restore the crop; and for this purpose it would be proper to sow on the barley, when the newly sown clover is just getting into the broad leaf. Probably it might not be so efficacious on land of a limestone bottom, if the soil be deep and mellow; at any rate it can do no good *where it is not wanted;* that is to say, on good soils that are plentifully dressed with good farm-yard compost and pulverized bones. Lastly, on a clover ley in spring, that looks pining and yellow, a dressing of this powder will almost double the crop. In this case it should be sown about May-day, and early in the morning, or in moist weather." Mr. Loudon in his 'Encyclopedia of Agriculture,' says, "Gypsum has been much used in America, where it was first introduced by Franklin on his return from Paris, where he had been much struck with its effects. He sowed the words, "*this has been sown with gypsum*," on a field of lucern, near Washington: the effects astonished every passenger; and the use of the manure quickly became general and signally efficacious." *P.* 847. †

"It is possible," adds Mr. Loudon, "that lands which have ceased to bear good crops of clover or artificial grasses, may be restored by being manured with gypsum. This substance," he says, "is found in Oxfordshire, Gloucestershire, Somersetshire, Derbyshire, Yorkshire, &c. and requires only pulverization for its preparation.—*Ib. p.* 847.

On the whole it appears to be most efficacious as a top dressing for clover, sainfoin, or lucern crops; and the quantity may vary from four to eight bushels an acre.

I *have* heard of its being successfully applied to other crops, as wheat, turnips, &c. Of the latter crop I have read somewhere an account, of every alternate row being manured with gypsum, and that the difference between the dressed and undressed rows was very striking. Any of your readers who have tried its effects on these and other plants, will do a public good by publishing their observations thereon, and at the same time confer a favor on,

A NORFOLK FARMER.

Norfolk, March 10th, 1837.

* This anecdote is evidently of European fabrication, and its falsehood is equally evident; yet it is precisely such a falsehood, as will go farther, and be more known and believed, than any truth yet published in regard to gypsum.—ED. FAR. REG.

† Which opinion, as we conceive, is altogether erroneous. See Far. Reg. pp. 603, 631, vol. ii. and pp. 126, 260, vol. iii.—ED.

From the American Journal of Science and Arts.

ACCOUNT OF THE EUROPEAN OYSTER—OSTREA EDULIS (LINN.)

Ancient history.—The oyster has probably been used from the earliest periods. As they lie in comparatively shallow water, quickly increase in numbers and size, and offer a very nutritious and refreshing food, we may reasonably suppose that the aborigines of those countries where they are found, were in general well acquainted with them. From Aristotle we learn that the Greeks in his time ate them.* It was as early as A. U. C. 633, that the mode of fattening them, by laying them in pits and ponds, was introduced to Rome. At that time, one Sergius Orata first tried the experiment on the Lucrine oyster, and as he made much money by it, and his plan succeeding well, it rapidly spread into different districts. As Rome increased in luxury, the supply from the immediate coasts was not sufficient, and all the shores of the Mediterranean were ransacked for the shell fish. They were frequently brought from a great distance, and at much expense, to be fattened in Italy for the Roman feasts. They abounded at Abydos on the Hellespont;† but the most celebrated appear to have been procured at Circæum, the Lacus Lucrinus, and from Brundusium. Much, however, of the fame of these places appears to have arisen from fashion, as we find writers of different times praising as the best, those from different districts. The most generally esteemed, however, seem to be those from Rutupiæ, (now Sandwich, in Kent, England,) and which were carried to Italy in great numbers. If we consider the difficulties of land carriage, and the slowness of sailing vessels in those times, we may form some idea of their price, and the height to which luxury in eating had attained. In latter times they appear to have been chiefly used for supper.‡ That many different species were used is probable. Pliny informs us that those from Circæum (Cape Cieceji) were black both in the flesh and shell, those from Spain reddish, and those from Sclavonia brown and dusky.‖ It was supposed that the fish fattened during the full moon, and grew thin as it waned; we are not aware thut this has been observed in the present day, but it may have happened in particular situations, owing to the difference in the tides. The Roman epicures were in the habit of icing them before eating them, and the ladies used the calcined shell as a cosmetic and depilatory. To the doctors this fish was most valuable, being recommended in a great variety of diseases, and prepared in various ways; and though it could, generally speaking, do no good, it certainly could do little harm.

Modern history.—In England, the oyster fisheries are chiefly carried on at Colchester, in Essex, celebrated for its *green* oysters, at Feversham and Milton in Kent, and in the Isle of Wight. They are also fished for in the Swales of the Medway, in the Tenby on the coast of Wales, and near Liverpool, as well as around Portsmouth, and in many of the creeks of the southern coast. The best are found at Purfleet, the worst near Liverpool. They are very plenti-

* Aristotle de Hist. Animal lib. v. cap 15.
† Virgil, Georg. i. 207.
‡ Juvenal, Sat. vi. 301.
‖ Plin. Hist. Nat. lib. ix. cap. 32.

fully but partially distributed, and are found to extend further north on the western than on the eastern side of the island. In Scotland they also abound, but appear likewise to prefer the northeastern to the northwestern coast. While they are every where plentiful and highly flavored, from the Clyde to the Zetland, Orkney and Western Islands, it does not appear that they breed higher on the other side than in Frith of Forth. Those on the western shores are, however, comparatively little used, and with the exception of a few sent from Loch Farbert to Greenock, they are consumed by the natives on the spot. Those of the eastern coast, on the contrary, are carried to Newcastle upon Tyne, Hull and London, and have been exported in large quantities to Holland. The best are procured near Preston Pans, Port Seaton, and the Isle of Inchkeith, in Musselburgh bay, Frith of Forth; and vessels from Milton, Lee, and other parts of England come to dredge for them, and carrying them away, afterwards fatten them for the English markets. Those from Preston Pans are known by the name of *Pandoors*, as being found at the door of, or near the Pans, and from the quantity of fresh water are the fattest and best flavored. In Ireland, Milford Haven is celebrated for its oysters.

Oysters are found on most parts of the French coast, but they are most plentiful on those of Bretagne and Normandy. The most extensive fishery is that which is carried on at Granville, in the bay of which, and for six leagues to the northward, they abound. The fishermen bring them to the town and dispose of them to women, who, after having fattened them, dispose of them, either pickled or in the shell. Paris, Dieppe and Rouen are chiefly supplied from this place, for which purpose boats are continually arriving from other parts. The oysters from Rochelle and Bordeaux and generally from the coast of Bretagne, are however by far the most esteemed; being fatter and more highly flavored, owing to the quantity of fresh water there running into the ocean. Here they are *greened* in the same manner as in England, and require about the same time to come to perfection. They are all to be met with in Paris, but those from Normandy in the greatest numbers. The appetite for shell fish of all sorts, which seems peculiar to the natives of the southern provinces of Italy, is such as to appear exaggerated to a foreigner, accustomed to consider but a few of them as eatable. So great however is it, that at Taranto, the government draws a revenue of twenty-four thousand ducats annually from the shell fishery alone. In the Mare Picolo, on which this place is situated, the spawn of the oyster is received on large conical earthen pans, secured at equal distances by ropes tied to them and sunk in different parts of the bay. Their appearance is equally singular and beautiful; the vessel become entirely hidden by the shells, when the whole assumes the form of one solid but irregular mass of rockwork. The young oysters being rubbed off are scattered through various parts of the bay, and finally, when sufficiently grown, are collected by means of iron rakes.

Of the quantity of oysters consumed in England, we have no certain or continuous statistics. In 1824, the quantity bred and taken in the county of Essex, and consumed mostly in London, was supposed to amount to fourteen thousand or fifteen thousand bushels. They are at times imported in considerable numbers, but the yearly quantity is subject to important fluctuations. In the season of 1801-2, one hundred and eighty-eight British vessels, carrying from six to nine men each, were entered at the custom house of Cancale in France, and carried back one hundred and nineteen millions four hundred and seventy-three oysters, chiefly to London. On an average of of 1831—1832, the imports into the same city amounted to fifty-two thousand and ninety-five bushels a year. In or about 1786, Glasgow consumed twenty thousand annually, which were carried from Leith, on horseback or by carts, across the country. The quantity in the present day must be much greater. In 1803, the consumption of Paris was estimated at one million dozen, selling on an average at six sous per dozen.

Natural habits.—The European oyster is smaller, thinner, and more rounded than the American, while the lower valve is less concave or vaulted, it is not beaked, and the fish, compared with the size of the shell, is smaller and of a different flavor; there are besides, various other differences, and their habits are so very dissimilar that there can be no doubt at all of their being distinct species. The European oyster is found only adhering to rocks and stones, or occasionally to very strong clayey bottoms; and should these be washed away, the oyster beds perish. The fish is viviparous, and the young produced with a perfectly formed shell. They are, when first emitted, quite transparent, and they swim with great quickness, by means of a membrane extending out of the shell. So small are they in this state, that Van Leeuwenhoek computes that one hundred and twenty of them in a row would extend an inch, and consequently a globular body, whose diameter is an inch, would, if they were round, be equal in size to one million seven hundred and twenty-eight thousand of them! The vulgar opinion, and that on which the restraining laws have been framed, is, that the period of spawning is May, at which time the young, or *spat*, is found adhering to the rocks. But as the young, as described above, are found in the parents perfectly formed and alive in the month of August, this is most probably the period of parturition, though it be not till May that they become fixed or sufficiently grown to be seen by the common observer. At this time they are about the size of a sixpence. and comparatively hard and firm, and have been well compared to a drop of candle grease in water. In two, or at farthest three years, they are fit for the table. The age to which it attains is probably great, but after having arrived at its full size, the valves are thickened, instead of being increased in length or breadth. From May to July, both the male and female or oysters are said to be *sick*, and are in thin and poor condition, but by the end of August they have again recovered, are fat and in season. The sexes are distinguished by the fishermen, by the color of the fringe, that of the male being black, or dark colored, that of the female white. Sand is prejudicial to them, a mixture of fresh water advantageous. The shell, according to Mr. Hatchett, is formed of carbonate of lime and a great proportion of animal gluten, but more intimately mixed, and not lying in regular layers, as in the perla-

ceous shells. * The oyster frequently contains shining intestinal worms, or animalcules, which may be seen by opening the shell in the dark. A most destructive animal in an oyster bed is the sea-star (*Asterias glacialis*, Linn.) which clasps its rays round the shell and perseveres till it has sucked out the inhabitant. Another enemy is said to be the muscle, (*Mytilus edulis*, Linn.)

Fishery.—In both England and France the season for fishing for the oyster is restricted by law. In the former country the time allowed for collecting the spawn from the sea is May, when the dredgers may take all they can procure; but after that month, they are liable to be convicted of felony if they disturb it, and only allowed to take such oysters as are the size of half a dollar. The spawn, or *spat*, as it is technically called, is dredged up, and if not too small, they separate it from the shells and stones to which it is adhering, and these they are obliged again to throw into the water to prevent the beds being destroyed. The spat is thrown into creeks or into shallow water on the shores, to increase in size and fatten, and in such situations is considered private property. At Preston Pans the oysters are not *bedded*, but are entirely procured from the sea, and in dredging, those which are too small are thrown back again. The season begins on the first of September, and lasts till April. The dredgers make use of a peculiar kind of net, which is very strong, and fastened to three spikes of iron; this they drag along the bottom of the sea, and thus force the oysters into it; each boat requires five men, and they dredge in water from four to fifteen fathoms deep. The *green* oysters are all procured at or near the neighborhood of Colchester. When they wish to give them this color, they throw them into pits dug about three feet deep in the salt marshes, which are overflooded only at spring tides, and to which they have sluices to let out the salt water till it be about one and a half feet deep. These pits become green, and communicate their color to the fish in four or five days, although they commonly let them continue there six weeks or two months, in which time they will become a dark green. The color has recently been ascertained to arise from confervæ, and other marine vegetable matter, decayed by the heat of the sun, on which the animal feeds. A very common and very mistaken opinion exists, especially among foreigners, that not only those, but all English oysters are impregnated with copper, "*which they get from feeding off copper banks*;" such we believe would be quite as injurious to the animal itself as it could be to us, and the fancy can only have arisen from the strong flavor peculiar to this fish. Green oysters are comparatively little esteemed in the present day.

Use.—The great value of this animal is for diet. The shell was at one time supposed to possess peculiar medical properties; but analysis has shown that the only advantage animal carbonates have over those of the mineral kingdom, arises from their containing no metallic or foreign substance. * The inhabitants of the shores of Hindoostan did, two centuries since, and perhaps still may, use it in the same manner. The fish is recommended by the dectors where great nourishment and easy digestion are required, the valuable quality being the quantity of gluten it contains. In the north-eastern parts of England, old houses may be seen with their tops and gable ends ornamented with these shells, only the inside being exposed; a custom which is said, we know not with what truth, to have been introduced from Holland. In some, parts of Scotland the shells are used as manure, and found very excellent and stimulating; in other places they are burned as lime.

In 1768, Mr. John Canton discovered that a very good phosphorus † could be made from oyster shells. He added a little sulphur to them, and by calcination produced the substance. A long account of the process and his experiments is given in the 'Philosophical Transactions' of that year. The French have a proverb drawn from this animal which they apply to an awkward person, "*il parle, ou joue, &c. comme une huitre á l'écaille.*" ‡

Besides these, oysters are found in most countries; the following are a few of the species.

The West Indies have, according to Hughes, two oysters, a large one in deep water, which is seldom eaten, and the mangrove oyster, which, adheres to the roots of the trees in the wash of the tide, whence the old fable of oysters growing on trees. The same are found in Sumatra, where we are told that they are by no means so good as those of Europe. § Round the shores of New South Wales, oysters are extremely plentiful, and though generally small, are of delicate flavor. Every rock is covered with them, and Mr Martyn informs us he has seen parties of young la-

* Professor Rogers doubts the accuracy of this analysis, as regards the quantity of animal matter contained in this shell, and he supposes that there only exists a very minute portion of gluten. In this opinion he states that he is supported by the experiments of Bucholtz and Brandes, and those he himself made on the *Ostrea Virginica*. What the shells were which were used by the former gentleman, we are not informed; but with all deference we would suggest that he himself seems to have forgotten that the American and British shells are quite distinct species, from which most probably arises the difference he has discovered, and which instead of proving Mr. Hatchett's experiments to be in the main incorrect, only tends to prove that the species are perfectly distinct, and not mere varieties. The quantity of gluten contained in the *ostrea edulis*, is well known to even the most superficial observer, where the shell is common, and may be found in the large and thick specimens, or on decaying of the shell, between the inner and outer laminæ, frequently in great quantities. It is of a dirty yellow color, and thick and clammy in its consistency. See Silliman's American Journal, Vol. xxvi. p. 361.

* Iodine is found in some them.—*Ed.*

† So called from its emitting light in the dark after exposure to the sun's rays.—*Ed.*

‡ In compiling this article, the following works are those which have chiefly been referred to and quoted from:—Plin. Hist. Nat. lib. xxxii. cap. vi. lib, ix. cap. 36. Rees' Cyclopædia, Art. Oyster. McCulloch's Comm. Dict. Art. Oyster. Brewster's Edinburgh Encyclop. Art. Fisheries. Encyclop. Americana, Appendix, vol. viii. Art. Oyster. Postlethwaite's Diction. Art. Oyster. Sinclair's Stat. Hist. of Scotland, vol. i. p. 358. vol. vi. p. 196 vol. x. p. 202. vol. xvii. pp. 69, 102, &c. Keppel Craven's Tour, p. 184. Statistique generale, &c. par. P. E. Herbin, vol. i. p. 386. Diction. de Trevoux. Philosophical Transactions, vol. viii. 554 lviii. 337, ii. 606, &c. &c

§ Marsden's Hist. Sumatra, p. 121.

dies, with small hammers, seated on a large rock and feasting with great *gout* on these dainties. * In Southern Africa the oysters of Mossel Bay, are much celebrated, and their flavor considered so fine, that epicures have been induced to visit the bay from Cape Town, (Cape of Good Hope,) for the express purpose of enjoying a feast of them. The distance is about three hundred miles, so that they ought to be good to repay the trouble. †

WASHINGTON'S AGRICULTURAL NOTES.

[Notwithstanding the numerous public avocations and duties, in which Washington was engaged for a large portion of his life, it is known, that to no one object did he give so much of his time and attention as to agriculture. The frequency and minuteness of his directions to his managers on this head, and the unceasing correspondence which he kept up during his absence from Mount Vernon, are truly astonishing, when it is considered in what important and absorbing interests his mind was perpetually occupied. We have selected a few particulars from his manuscript papers, which, at the same time they illustrate his agricultural habits, may in part serve as practical hints, or salutary maxims, to farmers in general.]

Am. Almanac.

1. *Directions to the manager of his farm.*

A *system* closely pursued, although it may not in all its parts be the best that could be devised, is attended with immmerable advantages. The conductor of the business, in this case, can never be under any dilemma in his proceedings. The overseers, and even the laborers, know what is to be done, and what they are capable of doing, in ordinary seasons. The force to be employed may be in due proportion to the work which is to be performed, and a reasonable and tolerably accurate estimate may be made of the product. But when no plan is fixed—when directions flow from day to day, the business becomes a mere chaos, frequently shifting, und sometimes at a stand, for want of knowing what to do, or the manner of doing it. Thus is occasioned a waste of time, which is of more importance than is generally imagined.

Nothing can so effectually obviate the evil, as an established *system*, made known to all who are actors in it, that all may be enabled thereby to do their parts to advantage. This gives ease to the principal conductor of the business, and is more satisfactory to the persons who immediately overlook it, less harassing to the laborers, as well as more beneficial to the employer.

Under this view of the subject, the principal service which you can render me, is to explain to the overseers (who will be furnished with duplicates,) the plan, in all its parts, which is hereafter detailed; to hear their ideas with respect to the order in which the different sorts of work therein pointed out shall succeed each other, for the purpose of carrying it on to the best advantage; to correct any erroneous projects they may be disposed to adopt; and then to see that they adhere strictly to whatever may be resolved on, and that they are always (except when otherwise permitted) on their farms, and with their people. The work, under such circumstances, will go on smoothly; and, that the stock may be well fed, littered, and taken care of according to the directions, it will be necessary to inspect the conduct of the overseers in this particular, and those also whose immediate business it is to attend upon them, with a watchful eye; otherwise, and generally in severe weather, when attention and care are most needed, they will be most neglected.

Economy in all things is as commendable in the manager, as it is beneficial and desirable to the employer; and, on a farm, it shows itself in nothing more evidently, or more essentially, than in not suffering the provender to be wasted, but, on the contrary, in taking care that every atom of it be used to the best advantage; and, likewise, in not permitting the ploughs, harness, and other implements of husbandry, and the gears belonging to them, to be unnecessarily exposed, trodden under foot, run over by carts, and abused in other respects. More good is derived from attending to the minutiæ of a farm, than strikes people at first view; and examining the farm-yards, fences, and looking into the fields to see that nothing is there but what is allowed to be there, is oftentimes the means of producing more good, or at least of avoiding more evil, than can be accomplished by riding from one working party, or one overseer, to another. I have mentioned these things not only because they have occurred to me, but because, although apparently trifles, they prove far otherwise in the result.

To request that my people may be at their work as soon as it is light, work till it is dark, and be diligent while they are at it, can hardly be necessary, because the propriety of it must strike every manager, who attends to my interest, or regards his own character, and who, on reflecting, must be convinced that lost labor is never to be regained. The presumption is, that every laborer does as much in twenty-four hours, as his strength, without endangering his health or constitution, will allow. But there is much more in what is called head-work, that is, in the manner of conducting business, than is generally imagined. For take two managers, and give to each the same number of laborers, and let the laborers be equal in all respects. Let both these managers rise equally early, go equally late to rest, be equally active, sober, and industrious, and yet, in the course of the year, one of them, without pushing the hands under him more than the other, shall have performed infinitely more work. To what is this owing? Why, simply to contrivance, resulting from that forethought and arrangement, which will guard against the misapplication of labor, and doing it unseasonably. In ploughing, for instance, though the field first intended for it, or in which the ploughs may actually have been at work, should, from its situation, be rendered unfit (by rain or other cause) to be worked, and other spots, even though the call for them may not be so urgent, can be ploughed, this business ought to go on, because the general operation is promoted by it. So with respect to other things, and particularly carting, where nothing is more common, than, when loads are to go to a place, and others to be brought from it, though not equally necessary at the same moment, to make two trips,

* Martyn's Hist. of the Br. Col. vol. iv. p. 295.

† Webster's Voyage to the S. Atlantic Ocean, 1830, vol. i. p. 223,

when one would serve. These things are only mentioned to show, that the manager, who takes a comprehensive view of his business, will throw no labor away.

For these reasons it is, that I have endeavored to give a general view of my plans, as to the business of the year, that the concerns of the several plantations may go on without application daily for orders, unless it be in particular cases, or where these directions are not clearly understood.

2. *Particular directions for cultivating a farm near Mount Vernon.*

[The directions alluded to in the preceding article, for the management of the farms in the neighborhood of Mount Vernon, were given in December, 1799, a few days before Washington's death, and intended for the year 1800. We shall select here the part relating to one farm only (called the *River Farm,*) which may serve as a sample of the whole.]

Crops for the River Farm, and operations thereon, for the year 1800.

FIELD No. 1—Is now partly in wheat; part is to be sown with oats; another part may be sown with peas, broad-cast; part is in meadow, and will remain so; the most broken, washed, and indifferent part is to remain uncultivated, but to be harrowed and smoothed in the spring, and the worst portions (if practicable) to be covered with litter, straw, weeds, or any kind of vegetable rubbish, to prevent them from running into gullies.

No. 2.—One fourth is to be in corn, and to be sown with wheat; another fourth in buckwheat and peas, half of it in the one, and half in the other, sown in April, to be ploughed in as green dressing, and by actual experiment to ascertain which is best. The whole of this fourth is to be sown with wheat also; another fourth part is to be naked fallow for wheat; and the other and last quarter to be appropriated for pumpkins, cymlins, turnips, Yateman peas, (in hills,) and such other things of this kind as may be required; and to be sown likewise with rye, after they are taken off, for seed.

No. 3—Is now in wheat, to be harvested in the year 1800; the stubble of which, immediately after harvest, is to be ploughed in, and sown thin with rye; and such parts thereof as are low, or produce a luxuriant growth of grain, are to have grass-seeds sprinkled over them. The whole for sheep to run on in the day (but housed at night) during the winter and spring months. If it should be found expedient, part thereof in the spring might be reserved for the purpose of seed.

No. 4—Will be in corn, and is to be sown in the autumn of that year with wheat, to be harvested in 1801; and to be treated in all respects as has been directed for No. 3, the preceding year. It is to be manured as much as the means will permit, with such aids as can be procured during the present winter and ensuing spring.

Nos. 5, 6, 7, and 8—Are to remain as they are, but nothing suffered to run upon them; as ground will be allotted for the sole purpose of pasturage, and invariably used as such.

Clover lots.

No. 1—Counting from the spring branch, is to planted in potatoes.

No. 2.—That part thereof which is now in turnips, is to be sown with oats and clover; the other part, being now in clover, is to remain so until it comes into potatoes, by rotation.

No. 3—Is also in clover at present, and is to remain so, as just mentioned, for No. 2.

No. 4—Is partly in clover and partly in timothy, and so to be, until its turn for potatoes.

The rotation for these lots invariably is to be, 1. potatoes, highly manured; 2. oats, and clover sown therewith; 3. clover; 4. clover. Then to begin again with potatoes, and proceed as before. The present clover lots must be plastered.

All green sward, rough ground, or that which is heavily covered with weeds, bottle brush grass, and such things as being turned in will ferment, putrefy, and meliorate the soil, should in autumn be ploughed in, and at such times in winter as can be done while the ground is dry, and in condition for it.

Pasture grounds.

The large lot adjoining the negro houses and orchard, is to have oats sown on the potato and pumpkin ground; with which, and on the rye also in that lot, and on the melon part, orchard-grass seeds are to be sown; and thereafter to be kept as a standing calf-pasture, and for ewes (which may require extra care) at yeaning, or after they have yeaned.

The other large lot, north-east of the barn lane, is to be appropriated *always* as a pasture for the milch cows; and probably working oxen during the summer season.

The woodland, and the old field commonly called Johnston's, are designed for *common* pasture, and to be so applied always. To which, if it should be found inadequate to the stock of the farm, field No. 8, and the woodland therein, may be added.

Meadows.

Those already established and in train must continue, and the next to be added to them is the arms of the creek which runs up to the spring-house, and forks, both prongs of which must be grubbed up, and wrought upon at every convenient moment when the weather will permit, down to the line of the ditch, which encloses the lots for clover, &c.

And as the fields come into cultivation; or as labor can be spared from other work, and circumstances will permit, the heads of all the inlets in them must be reclaimed, and laid to grass, whether they be large or small, forasmuch as nothing will run on, or can trespass upon or injure the grass; no fencing being required.

Mud for compost.

The season is now too far advanced, and too cold to be engaged in a work, that will expose the hands to wet; but it is of such essential importance, that it should be set about seriously and with spirit next year, for the summer's sun and the winter's frost, to prepare it for the corn and other crops of 1801, that all the hands of the farm, not indispensably engaged in the crops, should, so soon as corn-planting is completed in the spring, be uninterruptedly employed in raising mud from the pocosons, and from the bed of the creek, into

the scow; and the carts, so soon as the manure for the corn and potatoes in 1800 is carried out, are to be incessantly drawing it to the compost heaps in the fields, which are to be manured by it. What number of hands can be set apart for this all-important work, remains to be considered and decided upon.

Penning cattle and folding sheep

On the fields intended for wheat, from the first of May, when the former should be turned out to pasture, until the first of November, when they ought to be housed, must be practised invariably; and to do it with regularity and propriety, the pen for the former, and the fold for the latter, should be proportioned to the number of each kind of stock; and both these to as much ground as they will manure sufficiently in the space of a week for wheat, beyond which they are not to remain in a place, except on the poorest spots; and even *these* had better be aided by litter or something else, than to depart from an established rule, of removing the pens on a certain day in every week. For in this, as in every thing else, system is essential, to carry on business well, and with ease.

Feeding.

The work-horses and mules are always to be in their stalls, and all littered and cleaned, when they are out of harness; and they are to be plenteously fed with cut straw, and as much chopped grain, meal, or bran, with a little salt mixed therewith, as will keep them *always* in good condition for work; seeing also, that they are watered as regularly as they are fed; this is their winter feed. For spring, summer, and autumn, it is expected, that soiling them on green food, first with rye, then with lucern, and next with clover, with very little grain, will enable them to perform their work.

The oxen, and other horned cattle, are to be housed from the first of November until the first of May; and to be fed as well as the means on the farm will admit. The first (oxen) must always be kept in good condition; housed in the stalls designed for them; and the cows (so many of them as can find places) on the opposite side. The rest, with the other cattle, must be in the newly erected sheds; and the whole carefully watered every day; the ice, in frozen weather, being broken, so as to admit them to clean water.

With respect to the sheep, they must receive the best protection that can be given them *this* winter; against the next, I hope they will be better provided for.

And with regard to the hogs, the plan must be, to raise a given number of *good ones*, instead of an indiscriminate number of *indifferent ones*, half of which die or are stolen before the period arrives for putting them up as porkers. To accomplish this, a sufficient number of the best sows should be appropriated to the purpose; and so many pigs raised from them as will insure the quantity of pork, which the farm ought to furnish.

Whether it will be most advisable to restrain these hogs from running at large or not, can be decided with more precision after the result of those *now* in close pens is better known.

The exact quantity of corn used by those, which are now in pens, should be ascertained and regularly reported, in order to learn the result.

Stables and farm pens.

These ought to be kept well littered, and the stalls clean; as well for the comfort of the creatures that are contained in them, as for the purpose of manure; but as straw cannot be afforded for this purpose, *leaves* and such spoiled straw or weeds as will not do for food, must serve for the stables; and the first, that is, leaves and corn-stalks, is all that can be applied to the pens. To do this work effectually, let the corn-stalks be cut down by a few careful people with sharp hoes, so low as never to be in the way of scythes at harvest; and whenever the wheat will admit carts to run on it without injury, let them be brought off and stacked near the farm pens. In like manner let the people, with their blankets, go every evening, or as often as occasion may require, to the nearest wood, and fill them with leaves for the purposes above mentioned; bottoming the beds with corn-stalks, and covering them thick with leaves. A measure of this sort will be, if strictly attended to, and punctually performed, of great utility in every point of view. It will save food, make the cattle lie warm and comfortable, and produce much manure. The hogs also in pens must be well bedded in leaves.

Fencing.

As stock of no kind, according to this plan, will be suffered to run on the arable fields or clover lots, (except sheep in the day on the rye fields, as has been mentioned before,) partition fences between the fields, until they can be raised of quicks, may be dispensed with. But it is of great importance, that all the exterior or outer fences should be substantially good; and those also which divide the common, or woodland pasture, from the fields and clover lots, are to be very respectable.

To accomplish this desirable object in as short a time as possible, and with the smallest expense of timber, the post and rail fence which runs from the negro quarters, or rather from the corner of the lot enclosing them, up to the division between fields Nos. 7 and 8, may be placed on the bank (which must be raised higher) running to the creek. In like manner, the fence from the gate, which opens into No. 2, quite down to the river, along the cedar hedge row, as also those rails which are between Nos. 1 and 2, and between Nos. 2 and 3, may all be taken away, and applied to the outer fences, and the fences of the lanes from the barn into the woodland pasture, and from the former (the barn) into No. 5; for the fences of all these lanes must be *good*, as the stock must have a free and uninterrupted passage along them, at all times, from the barn-yard to the woodland pasture.

All the fencing from the last mentioned place, (between me and Mr. Mason,) until it joins Mr. Lear's farm, and thence with the line between him and me, until it comes to the river, will require to be substantially good; at its termination on the river, dependence must be placed in a water fence; for if made of common rails, they would be carried off by boatmen for fire-wood. The fences separating fields Nos. 1 and 8 from the woodland pasture must also be made good, to prevent depredations on the fields by my own stock.

Crops, &c. for 1801.

No. 5, is to be in corn, and to be invariably in that article. It is to be planted (if drills are

thought to be ineligible until the ground is much improved,) in rows, 6 feet by 4, or 7 feet by 3½, the wide part open to the south. These hills are to be manured as highly as the means will admit; and the corn planted every year in the middle of the rows of the preceding year; by doing which, and mixing the manure and earth by the plough and other workings, the whole in time will be enriched.

The washed and gullied parts of this field should be levelled, and as much improved as possible, or left uncultivated. Although it is more broken than some of the other fields, it has its advantages. 1st. It has several inlets extending into it, with easy ascents therefrom. 2dly. It is convenient to the mud in the bed of the creek, whensoever (by means of the scow) resort is had thereto, and good landing places; and, 3dly, it is as near to the barn as any other, when a bridge and causeway shall be made over the spring branch. To these may be added, that it is more remote from squirrels than any other.

Nos. 6 and 7, or such part thereof as is not so much washed or gullied, as to render ploughing ineligible, are to be fallowed for wheat. One of which, if both cannot, is to have the stubble ploughed in and sown with rye, and the low and strong parts to have timothy or orchard-grass seeds, perhaps both, in different places, sprinkled over them, for the purpose of raising seed. On the rye pasture the sheep are to be fed in winter and spring, and treated in all respects as No. 3, in 1800.

In the years 1802, 1803, *and so on.*

The corn ground remaining the same, two fields, in the following numbers, will be fallowed for wheat, and treated in all respects as mentioned above; and if pumpkins, cymlins, turnips, peas, and such like growth, are found beneficial to the land, or useful and profitable for stock, ground may readily be found for them.

These are the great outlines of a plan, and the operations of it, for the next year, and for years to come, for the *River Farm.* The necessary arrangements, and all the preparatory measures for carrying it into effect ought to be adopted without delay, and invariably pursued. Smaller matters may, and undoubtedly will, occur occasionally, but none it is presumed, that can militate against it materially.

To carry it into effect advantageously, it becomes the indispensable duty of him, who is employed to overlook and conduct the operations, to take a prospective and comprehensive view of the whole business, which is laid before him, that the several parts thereof may be so ordered and arranged, as that one sort of work may follow another sort in proper succession, and without loss of labor or of time; for nothing is a greater waste of the latter, and consequently of the former, (time producing labor, and labor money,) than shifting from one thing to another before it is finished, as if chance, or the impulse of the moment, not judgment and foresight, directed the measure. It will be acknowledged, that weather and other circumstances, may at times interrupt a regular course of proceedings, but if a plan is well digested beforehand, they cannot interfere long, with a man who is acquainted with the nature of the business, and the crops he is to attend to.

Every attentive and discerning person, who has the whole business of the year laid before him, and is acquainted with the nature of the work, can be at no loss to lay it out to advantage. He will know that there are many things which can be accomplished in winter as well as in summer; others, that spring, summer, and autumn only are fit for; in a word, to use the wise man's saying, that "there is a time and a season for all things," and that unless they are embraced, nothing will thrive or go on smoothly. There are many sorts of *in-doors* work, which can be executed in hail, rain, or snow, as well as in sunshine; and if they are set about in fair weather, (unless there be a necessity for it,) there will be nothing to do in foul weather; the people therefore must be idle. The man of prudence and foresight will always keep these things in view, and order his work accordingly, so as to suffer no waste of time or idleness. The same observations apply with equal force to frozen ground, and to ground too wet to work in, or which, if worked, will be injured thereby.

These observations might be spun to a greater length, but they are sufficient to produce reflection; and reflection, with industry and proper attention, will produce the end that is to wished.

There is one thing, however, I cannot forbear to add, and in strong terms; it is, that whenever I order a thing to be done, it must be done; or a reason given at the time, or as soon as the impracticability is discovered, why it cannot be done, which will produce a countermand or change. But it is not for the person receiving the order to suspend, or dispense with its execution; and after it has been supposed to have gone into effect, to be told, that nothing has been done in it, that it *will* be done, or that it could not be done; either of these is unpleasant and disagreeable to me, having been all my life accustomed to more regularity and punctuality. Nothing but system and method are required to accomplish any reasonable requests.

From Mr. Blacker's Prize Essay.

THE QUESTION OF A SUPERABUNDANT POPULATION IN IRELAND CONSIDERED, AND REASONS GIVEN FOR DECIDING IN THE NEGATIVE.

I have already extended this treatise to a length much beyond my original intention, but I cannot conclude without endeavoring to answer one objection, which may be made to the opinions I have supported in the foregoing; I allude to my objecting to the expulsion of small holders, for the purpose of consolidating farms; in regard to which it may be asked, if this is not done, the population is increasing so rapidly, that as families grow up, subdivision must go on, until at length the whole community will become *paupers?* I might fairly ask in return, how the plan of turning out these families will prevent *pauperism?* It seems to me that the latter plan is by much the surest way to produce such a result. But the most satisfactory answer to the question will perhaps be arrived at, by endeavoring to ascertain how far the apprehensions of a superabundant population, at present so generally entertained, may or may not be justified by facts; for if it should appear that there was

land enough in the kingdom for all its inhabitants, now existing, and for as many more as could be anticipated in any reasonable time, and that nothing more was wanting but proper regulations to make it available for their wants, then the objection may be fairly considered to be set aside. In a late publication entitled "Ireland as it was, is, and ought to be," a table is given of the acreable contents and population of each county in Ireland, which may be supposed, at least, so far *relatively* accurate, as to afford data for the following calculations. From this table it appears that the county of Armagh contains 212,755 acres, and a population of 220,653 souls, and that the entire kingdom contains 17,190,726 acres, and 7,839,469 souls; now, in the county of Armagh, by a recent survey, more than one-seventh of the surface is taken up by lakes and unprofitable land, and the remainder is, for the greater part, but indifferently cultivated, and yet the peasantry are better clothed, lodged, and fed than they are in most other counties in Ireland. I cannot, therefore, be accused of taking away from the comforts of the rest of the kingdom, by taking the county of Armagh as a standard, and its proportion of unprofitable surface is not very remote, I believe from the average of others; if, then, 212,755, the number of acres in Armagh, give a population of 220,653 souls, 17,190,726 acres, the entire contents of the kingdom, ought to give a population of 17,828,888, in place of 7,839,469, the population at present. It therefore appears, that supposing the other parts of Ireland to be as well cultivated as Armagh, it would support about two and a half times the number of its present inhabitants, and be able to export provisions largely besides, for Armagh, notwithstanding its population, exports pork, butter, and grain in great quantities. But before deciding finally upon the population which the kingdom could support, it ought to be examined how far the county of Armagh (the standard taken) has arrived at its full complement; and in regard to this, I would say, from a pretty general knowledge of it, that under an improved system of agriculture, and a regular rotation of crops, the produce would be *treble* of what it yields at present, and I think this may be considered as practically proved, if I can show farmers possessing land of average quality, who being induced to change their manner of cultivation in the way already described, are now receiving fully treble produce from the identical same farm, to what it formerly yielded; but supposing it only to yield *double* as much, it would follow, that the population of Armagh, if that beneficial change became general, might be *doubled* also, without, in any degree, lessening the comforts of the inhabitants: which increase being taken as the basis of the calculation, and applying it to the whole of Ireland, would make it adequate to the support of better than thirty-five million of souls. When, therefore, it is considered what unexhausted, I might say unexplored, resources remain for the maintenance of any increase of inhabitants that can be expected in any definite period, it must, I think, be evident to every reflecting person, that all fears as to a *surplus population* are perfectly ideal, and that it is its unequal distribution, and not its aggregate amount, which is to be deplored. It may be said that the quantity of waste land in the country of Armagh is below the average of the kingdom, and this I have not the necessary returns exactly to ascertain; but the proportion in Armagh would give an amount of 3,000,000 of acres of unprofitable land in the whole of Ireland, which cannot be so far from the truth, as in any material degree to affect the result of the foregoing calculation.* If then such be the real state of the question, what, it will be demanded, can prevent the population now in existence from seizing upon comforts so completely within their reach, and applying themselves at once to the cultivation of these immense tracts of improvable land, at present lying useless? The answer to this will lead me to the point I wish to arrive at, and the reply I should give would be, that the *chief* reason was, *the want of security for person and property*, which deters the working classes from attempting to settle in any place remote from their own connexions, and thereby prevents the population from extending itself to the more uncultivated parts of the country; and being thus pent up in particular districts, it occasions land to be almost unattainable, where there is the greatest wish to cultivate it, and leaves it lying idle, where it exists in the greatest abundance. Any one, who knows anything of the state of Ireland, knows that it is not safe in a farmer to emigrate even to an adjoining parish, without paying largely for what is called the good will of the person to whom he succeeds, which explains fully the reason why a sum of money, nearly equal to the value of the *fee simple* of the land, is often given to get into possession of a farm under a respectable landlord, in a quiet neighborhood, although the land may be subject to its *full value in rent*. But to the want of security for person and property, may also be added, the want of *skill* and *capital* in the working population, and the consequent incapacity of those who have *neither*, to attempt the business of reclaiming, which requires *both*, and thus (even where land might be acquired) they cannot proceed, without meeting that support and assistance from the *landlords* which *they* are, generally speaking, unwilling or unable to afford; and thus things have been left to take their own course from century to century, the local improvement creeping on by degrees, as it happens to be pushed forward by the advancing tide of population in each particular district, without almost an instance of any thing being undertaken upon an extended scale, to bring into cultivation the numerous tracts of country, which would so well repay the sums that might be judiciously expended on them; and the land is left waste, which alone is capable of affording the necessary employment, and the people are left turbulent, discontented, and disaffected, and will always remain so, until employment is provided for them. The existing state of things, therefore, operates as cause and effect: the land lying waste leaves the people lawless and turbulent; and again, the lawlessness and turbulence of the people is the causes of the land being left so.

From the American Journal of Science and Arts.

ON SPONTANEOUS COMBUSTION.

By James Mease, M. D.

In my 'Archives of Useful Knowledge,' vol. iii. p. 167, I recorded three cases of the sponta-

* The Commissioners of Bogs, in their fourth report,

neous combustion of large masses of bituminous coal from Virginia, two in cellars, and a third under a close arch, all of which occurred in Philadelphia.* A fourth case was stated of one thousand two hundred chaldrons of coal "in a close compact magazine" in Paris, and a fifth of one thousand six hundred tons of the same article in the royal ship-yard in Copenhagen and all consumed, together with one thousand four hundred houses. This happened in the year 1794.†

Bituminous coal has on other occasions taken fire. In the year 1822, October and November, three cases occurred of this in the navy yards of Brooklyn, New York, Portsmouth, New Hampshire, and Washington city. The coal was from Virginia, and lay exposed to the air and rain.

In the year 1828, one hundred chaldrons of coal which had been placed several weeks before on wet ground in Boston, took fire, with a volume of sulphurous matter rising in a state of ebullition. It was remarked that this was the third instance of the kind within the past year in that city.

Another case was mentioned in the newspapers as having taken place in Ridgley's coal-yard, Baltimore, some years since, in the month of August. This coal also was doubtless from Virginia. A similar accident has recently occurred in the coal yard of Nutter & Co., New York, to sixty tons of Virginia coal. (July, 1837.)

Mr. Dupont, the late extensive manufacturer of gunpowder, informed Dr. Seybert, that charcoal was also liable to spontaneous combustion when in powder and piled in a heap. He had suffered loss from this cause, and a similar accident had occurred near Paris.

The French commissioners charged by the French government to examine into the causes of the explosions of powder factories, ascertained that charcoal in the lump, by attrition took fire. Charcoal inflames according to M. Caussigni, by the pressure of mill-stones, and has taken fire in the box of the bolter, into which it had been sifted; the coarse powder experienced no alteration. *Annales de Chimie, No.* 35.

Mr. Sage saw the roof of one of the low wings of the mint at Paris set on fire by the spontaneous combustion of a large quantity of charcoal that had lain in the garrets.

Two instances of spontaneous combustion took place in the powder manufactory of Essone, in the year eight and ten of the French republic; the first in the box for sifting the charcoal, and the second in the charcoal repository. Bartholdi attributes them to phosphorus in the charcoal.

May not one or more of the conflagrations of powder mills, which have taken place in the United States during the two past years, have been caused in this way?

Linen, cotton, and woollen cloth, or the raw materials of these fabrics, impregnated with flax-seed oil, or paint, or varnish, have frequently proved the causes of spontaneous inflammation.

Several years since a piece of canvass, forty yards in length, painted with white lead and oil, and exposed to the sun for some hours, was rolled up and put under cover. The next morning it was found smoking, and the whole, except a yard, burnt to cinder, with a hole through the bottom of a wagon. This happened at Mount Pleasant, Virginia. A large piece of coarse muslin, thoroughly oiled for the purpose of making covers for boxes, was left over night, folded loosely in a shed in a yard in Market street, Boston; in the morning, it was found burnt entirely through, and about to blaze. (1831.)

A quantity of wool prepared with the usual proportion of oil for carding, and thrown into a heap in the evening, was found the next morning ignited, and the floor to a considerable extent on fire. This happened at Hamlin & Bates' factory; and another instance occurred at the establishment of Warner & Whetton.* Lamp oil was used. (1831.) A quantity of cotton clothing for seamen's suits, had been oiled and hung up at Duxbury, Massachusetts, for a fortnight to dry, and were then taken down, rolled together, and placed in a shed; the next day they were found on fire. (1831.)

The Schr. Hiram, laden with wool, when on a voyage from Bilboa to New York, in March 1825, was set on fire, in consequence of some linseed oil having been spilt on the cabin floor.

Two pounds of wool greased with flax-seed oil, near Germantown, Pennsylvania, set fire to the building next morning. (1818.) The closet in which the paint and oil were kept at Bosher's carriage factory, Richmond, Virginia, having been smeared with linseed oil, burst out in a flame. (1832.)

Some cotton used in cleaning the cabin of the ship Birmingham, became partially filled with flax-seed oil, and after some time it ignited. An express experiment proved that cotton thus impregnated would inflame in two hours. (New York, 1831.)

Cotton rags, while delivering from the cellar of a store, 24 Broad street, New York, were found on fire. Oil had been spilt on them. (June, 1834.)

Mr. Durant's large balloon, varnished for the first time, exposed to the sun through the day, and rolled up in the evening, and deposited upon chairs in a house in Jersey city, was found the next morning entirely consumed. The varnish was composed of oil, turpentine and caoutchouc. (June, 1832.)

Mr. Atkinson of Ellicott's mills, near Baltimore, stated that flax-seed oil spilt on [wood] ashes in an iron kettle, caused the ashes to inflame in twenty four hours. He made an experiment to test the fact with success. Mr. Patterson, President of the United States' Mint, repeated the experiment with cold hickory ashes, and one pint of flax-seed oil; in forty six hours after, the mixture was fairly ignited, and in a short time emitted flame, which continued upwards of an hour. After the flame had ceased, the ignition continued

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calculate the extent of waste land that might be reclaimed at 2,830,000 acres, which coincides pretty nearly with the calculation here made.

* This last was from Dr. Seybert's paper on Spontaneous Combustion, in New York Medical Repository, Hexade 3d, vol. iii. Two similar facts are given by Bartholdi, *Annales de Chimie*, No. 144: and translated in Tilloch's Philos. Mag. vol. xviii.

† In my additions to the article "Inflammation," in Willich's Domestic Encyc., I have given nine cases of spontaneous combustion from various causes.

* Both at Plainfield, Massachusetts. Ample experience has taught European manufacturers that no oil should be used for greasing wool, but that of rape seed.

for eighteen hours, and the ashes were then poured out of the vessel. (1820.)

A canvass recently painted with flax-seed oil, and then dried and rolled close, took fire after being three hours exposed to the sun on the deck of the Schooner Olive, at Troy, New York. (August, 1820).

A piece of old packing-sheet, which had lain long about an oil and color warehouse, and was besmeared with different kinds of vegetable oils, on being thrown behind some casks pretty much confined from the air, inflamed.—*Edinburg Phil. Jour.* vol. vii. p. 219.

A cask of oat meal left from May to August in a kitchen in Glasgow, caught fire and was totally consumed, together with the barrel.—*Thomson's Annals*, vol. xvi. p. 390.

A parcel of hops well dried, were put into a home-spun cotton gown and placed on a heap of cotton seed; after three months they inflamed. Cotton it was remarked has frequently been known to take fire spontaneously in a moist and heated atmosphere.—*Milton, N. Carolina paper.* (1824.)

Certain ochres ground in flax-seed oil, inflamed during the act of trituration.

Alder charcoal has taken fire in the warehouses in which it was stored.* One of sixty three casks of lampblack on board the ship Catherine, bound to India from England, ignited, but was discovered by the fumes before it had burst into a flame.—*Old Monthly Mag. Lon.*, 1827, p. 91.

Wet Cotton.—The ship Earl of Eldon, in August, 1834, was set on fire, by reason of having shipped cotton in the rain at Bombay.

A similar occurrence took place in 1836, on board a vessel which had taken in cotton at Apalachicola, Florida, during rain.

A piece of red cedar about two ounces in weight, broken in two, and laid upon the shelf of the store of Mr. Adam Reigart in Lancaster, Penn. inflamed after two years had elapsed, in June, 1834. It was part of a tree found in excavating the deep cut of the rail road, at the "Gap in the Mine Ridge," Lancaster county, thirty feet below the surface. The combustion was proceeding so rapidly, that the shelf would have been in a few minutes on fire, and it evidently commenced in the interior of the wood, as some of the outer fibres were sound.—*Hazard's Register of Pennsylvania*, vol. xiii, p. 399.

Haussman relates that several dozens of skeins of cotton, dyed red, and impregnated with an alkaline solution of alumina, with excess of boiled linseed oil, were placed on a straw-bottomed chair, under a window, and at midnight they inflamed.†

A heap of horse manure inflamed in the month of May, 1822, at Sharon, in Connecticut. The fire was two feet in circumference. *American Journal of Science*, vol. v. p. 201.‡

* B. G. S. Walker's Archives, vol. iii., p. 80.

† His theory of this is as follows: "In all cases where the oxygen of the atmosphere is rapidly attracted and absorbed, the caloric, which serves as a base to the oxygen, giving it the qualities of gas, or elastic properties, is disengaged in such abundance, that if the absorbing bodies are susceptible of taking fire, or if combustible bodies are in the neighborhood, a spontaneous inflamation will take place."—*Annales de Chimie, No.* 144. *Tilloch, Vol.* 18.

‡ It appeared subsequently, that this case of supposed spontaneous combustion was the work of an incendiary; the communication of both facts was from the same person, a respectable physician.—*Editor.*

From Loudon's Gardener's Magazine.

A SUMMARY VIEW OF THE PROGRESS OF GARDENING, AND OF RURAL IMPROVEMENT GENERALLY, IN BRITAIN, DURING THE YEAR, 1836; WITH SOME NOTICES RELATIVE TO THE STATE OF BOTH IN FOREIGN COUNTRIES. BY THE CONDUCTOR.

The progress of a science, or of an art, is not so readily measured by the advances made in it, during the comparatively short space of a year, as by a comparison of its present state with its state at some former and more distant period. Accordingly, if we were to look back six years, and to compare the state of gardening in Britain in 1836, with its state in 1830, we should find a wonderful difference between the too periods; more especially with reference to public institutions. In 1830, there were only two zoological gardens in Britain, and these were both in the metropolis. Now we have zoological gardens established at Dublin, Liverpool, and Bristol, and others are projected, or commenced, at Cheltenham, Birmingham, Manchester, and various other places. The number of provincial horticultural societies has, also, been nearly doubled during the same period.

But, though surveys of the state of an art made at different intervals may afford the most striking views of its progress, surveys at short and regular periods appear better calculated to stimulate to improvement, by speedily making known to all what is done by a few; and hence the utility of an annual summary view like that which we are now about to submit to the reader. Our notices under each separate head will be very slight, but the reader who wishes to enter into the details of any particular subject or improvement, has only to look for it in the table of contents.

Gardening as a science.

The education of gardeners.—The most remarkable circumstance which has occurred during the past year is, the determination of the Horticultural Society of London to admit no young men into their garden, as journeymen, who have not received a certain degree of school education; and to recommend no journeymen from the gardens, to fill situations as head gardeners, who have not been regularly examined as to their physiological and other scientific knowledge, and received a certificate stating the degree of proficiency they have attained. The details of this measure, with our remarks on it, will be found at p. 610. We consider this as by far the most important step for the improvement of gardening that has been taken by the Society since its commencement; and this step, by its immediate influence on the young men who may be candidates for admission into the garden, and by its indirect influence in other places, in consequence of the plan being imitated by other societies, will speedily be felt, not only in Britain, but on the continent, in North America, and, in short, throughout the world.

It has appeared to us that the rules and regulations of the London Horticultural Society adopted in 1826, with reference to gardeners employed in

their gardens, had a tendency to depress, and even degrade, young men desirous of becoming proficients in gardening, rather than to encourage them; and to lower the art of gardening, and the profession of a gardener, in the eyes of the country gentlemen, their employers, rather than to elevate both. In fact, it appears to have been thought by the influential party connected with the Horticultural Society, about the time the garden at Chiswick was commenced, that it was possible to improve the art of gardening without at all improving either the minds or the condition of gardeners; and that, while the latter were to be kept stationary as far as respected themselves, the productions of the gardens they cultivated were to be greatly increased in excellence, or enhanced in value, by being produced at unusual seasons. We refer, for the grounds of our opinion, to the *Report of the Garden Committee, &c.* published in March, 1826, an abstract of which will be found in Vol. 1, 312–316. In that *Report* two conditions only are stated with reference to young men desiring admission into the garden; viz. first, that the party should be recommended by a subscriber; and, secondly, that he must be between the ages of eighteen and twenty-six, educated as a gardener, unmarried, and "*capable of reading and writing moderately well.*" These young men are designated in the regulations as "laborers," and the terms "gardener" and "under gardener" are only applied to the head gardener and the foremen of the different departments.

It is curious and interesting to look back to the time of the commencement of this Magazine (1826,) and to mark the different opinions which now prevail amongst the higher ranks respecting the working classes of society, from what were prevalent even at that short distance of time. The working classes, and more especially servants of all sorts, were then considered as the natural enemies of the wealthy and independent classes; and the great object of government, and of individuals, was to keep them ignorant of every thing beyond the kind of work in which they were employed. The contrast between these times, near though they be, and the times at present, is indeed most remarkable; and not less remarkable than it is gratifying. We find, in 1836, a committee of the House of Commons recommending the establishment of a general system of education, in which all useful knowledge is to be taught to all persons; and another committee (that on the fine arts) recommending the establishment of schools of design, museums, and libraries, for the benefit of the working mechanics and manufacturers; and also the establishment of botanic gardens, &c., for the same purpose. We find, too, a benevolent individual in the House of Commons, and a highly respectable committee under the presidency of the Earl of Euston (see *Architectural Magazine*, vol. iii. p. 360,) recommending the establishment of public gardens and public baths, and promenades for the health and recreation of the inhabitants of towns. It is evident, from these appearances, that the working classes are now looked upon in a very different point of view from what they were formerly; and that, instead of attempting to keep them under as slaves, or useful living machines, they are now considered worthy of enjoying life, as well as the rich, and of being raised to the moral and intellectual level of their employers. Such is the wonderful change of opinion that has come over the face of society in this country during the last ten years!

It is highly satisfactory to us to find the London Horticultural Society keeping pace with the spirit of the times; and co-operating with the general desire for improvement. The idea of examining gardeners in the manner before stated, we have no doubt originated with Dr. Lindley, who has thus rendered a most important service to the gardening world. It affords us some satisfaction to reflect that, from the period of the publication of the first edition of the *Encyclopædia of Gardening*, in 1822, to the present moment, we have always been an advocate for a general system of education applicable to all; and especially for highly educating gardeners. We have persisted in recommending this, both in the *Gardener's Magazine*, and in the *Magazine of Natural History*. Mr. Denson, in the year 1834 (see vol x. p. 59.), also strongly recommended that candidates for the curatorships of public gardens should be examined by a professor of established reputation, either belonging to the institute, or hired for the occasion; an excellent idea, which may afford a valuable hint to provincial societies of various descriptions, both with reference to their curators, and to the recommendation of young men from their gardens.

The London Horticultural Society having advanced in their conditions of qualifications for the admission of young gardeners, from "reading and writing moderately well" (see vol. i. p. 315.), to "writing, arithmetic, land-surveying, mapping, and geography" (see p. 610.), the circumstance will not only tend to raise the character of gardeners but to show the real practical value of school education to working men generally. This will consequently aid in accelerating the progress of measures for establishing a national system of education; a part of which system will consist in the examination of pupils, and the granting of certificates from the masters and managers of the national schools to all persons whatever that have been educated in those schools, after they have been publicly examined. These certificates, by showing the natural taste and acquired knowledge of the pupils, will regulate the kind of profession, or employment, to which they are most likely to apply with success. This is the case at present in Wirtemburg and other parts of Germany. See vol. v. p. 692.)

Vegetable Physiology and Systematic Botany. We have not much to say under these heads. The facts that plants may be kept alive in the smoke of cities, and in close rooms, by covering them with glass cases, the lower rims of which are placed in water, so as to exclude the free entrance of air; and also that they may in this manner be transported in a living state from any one part of the world to any other part, have been proved by the indefatigable zeal of Mr. Ward, whose experiments we have noticed in former volumes. A curious fact, which bears on the subject of the duration of the vitality of seeds, will be found noticed in a paragraph in a future page, respecting some raspberry seeds which vegetated after having been buried many centuries. A hybrid plant between *cytisus purpureus* and *c. laburnum* has reverted to its original parentage; by one part of the plant becoming *cytisus purpureus*, and the other *cytisus laburnum;* which seems to

show that permanent hybrids cannot be produced between genuine species; and to confirm that part of the definition of a species which designates it as a form which cannot be obliterated either by nature or art. A botanical society has been established in Edinburgh, and another in London. (See "*Domestic Notices.*")

New agents of culture.—Of these the most valuable which has been produced during the year is Reid's new hydraulic machine, which combines all the advantages of a syringe, and most of those of a garden watering-engine. In this machine, a great acquisition of power is obtained by having two cylinders, in one of which the air is compressed as in Montgolfier's engines. We regret to observe that, owing to the imperfection of the present laws relating to patents, Mr. Reid's invention (the most important, we think, that he has yet made for gardening) has been pirated by two individuals. A double action garden pump, invented by Mr. Greene of Sheffield, has been exhibited at some of the provincial shows; but we have not had an opportunity of seeing it. A pruning-knife for vines, and a botanist's spud, with some other articles belonging to this department of gardening, will be found figured or described under their appropriate heads.

Landscape-gardening.—We are not aware of any remarkable improvement that has been made in this branch of the art, as such; but we think we may refer to several papers in the present volume, to show that a knowledge of it is making considerable progress among practical gardeners. Nothing contributes more to the improvement of any young man in landscape-gardening, than visiting country seats and gardens, endeavoring to ascertain the causes of their beauties and defects, and committing his criticisms and remarks on what he has seen to paper. One advantage of writing down our opinions, accompanied by our reasons for having formed them, in this as in every other case, is, that the doing so obliges us to examine our opinions with more care; and thus to test their justness and propriety. By this means a habit is attained of thinking correctly, as well as of writing correctly; and these will ultimately lead to habits of order in every thing.

In Garden Architecture, some very useful designs appear in the present volume, accompanied by highly instructive remarks. A plan for laying out a public cemetery well merits attention; and there are various designs for different descriptions of forcing houses. The practice of heating by hot water continues to increase; and the two modes most generally in use about London are, that with common horizontal pipes and an open boiler; and that practised by Weeks, by which the water is first raised to a level varying in height according to circumstances, and afterwards circulated in small tubes on the same or on different levels; every inequality being overcome which is below the level of the elevation to which the water is raised. Cast-iron tubes are in most general use; but zinc is employed in some places, and earthenware in others; and at Vienna, glass, as will appear by the design of a house so erected, which will be given in our succeeding volume. The use of iron sash-bars, and of curvilinear surfaces, in the construction of hot-houses, appears to be on the increase.

Arboriculture.—The advantage of girdling trees has been pointed out by Mr. Ward; and Mr. Gorrie has illustrated Mr. Lawrence's plan for forming plantations with a view to facilitate their after-management. The difference between the stalked fruited oak, and the sessile-fruited oak, as painters' trees, has been shown, for the first time, we believe, by the Rev. W. T. Bree. The establishment of the pine and fir tribe, in situations where they are liable to be blown down by high winds, may be effected by increasing the number and strength of their roots; and this, it is said, is to be done by pinching off the leading shoot of the tree for several years in succession. A paper illustrating this theory was read by Mr. Nuttall at the British Association; and we expect to be able to give the essence of it, together with some other interesting particulars respecting the pine and fir tribe, in our succeeding volume. A number of papers on the study of trees, on their culture, on the dimensions which they have obtained in different parts of the country, and on the comparative progress which they have made in different soils and situations, are distributed throughout this volume; and some of them, we think, are extremely interesting. No new trees have been introduced from foreign countries during the past year; but some old trees, and some new shrubs, will be mentioned in our Arboricultural notices for January, 1837.

Floriculture, as a branch of cultivation, may be considered as advancing, both in the ordinary and in the higher departments. Great progress is yearly making in raising new sorts of roses, dahlias, pansies, &c., from the seeds produced by flowers which have been cross-fecundated; and great progress, also, is making in the difficult culture of the tropical *orchideæ*. New orchideous plants are being continually introduced, chiefly from South America; and hardy herbaceous plants, which have been raised from seeds sent home by Douglas, Drummond, and other collectors, or brought to England by travellers, are coming into flower from time to time, and are thus added to our collections, and recorded in our catalogues. All of these which have been figured in the botanical periodicals in the course of the year will be found enumerated in our Floricultural and Botanical notices. The most beautiful hardy annual of the year is *phlox drummondi;* and the most beautiful new dahlia Dod's Mary. The most interesting modes of cultivating flowering plants given in the present volume are, those applied to the *brugmansia* by Mr. Spence, and to the *solandra* by Mr. Symonds.

Horticulture.—A notice by Mr. Thompson, the fruit-gardener in the London Horticultural Society's Gardens, of the new fruits which have been lately proved, and deserve culture, will be found in a succeeding article, followed by one on the new culinary vegetables of the past year. By far the most remarkable tropical fruit which has been brought into notice for many years is the *musa cavendishii*, which, produces abundance of highly flavored fruit, at an early age, with less care and attention than either the pine-apple or the melon. From the difficulty of procuring plants, this *musa* has not yet been much cultivated; but the reader will find in p. 316, the high anticipations that have been formed of it by Mr. Paxton, who, in a letter to us dated Nov. 8., informs us that after nine months' trial he has no reason to suppose that his

most sanguine expectations will not be realized. We are not aware of any remarkable culinary vegetable having lately attracted attention, though some new modes of managing those in general cultivation will be found treated of by different correspondents. The articles on cropping kitchen-gardens, on the management of fruit trees, and on fruit tree borders, by Mr. Errington; those on the cultivation of the pine and vine, by Mr. Forsyth, that on the cultivation of chicory, by Dr. Lippold; and various others, will be found highly instructive to the practical gardener. The quinoa can scarcely be considered as having answered as a spinach plant; but it ripens abundance of seeds, which may, perhaps, form a useful substitute for rice or millet. In our notices of the provincial societies, it will be seen that Sir Charles Lemon is cultivating the quinoa on a large scale. Few experiments have been made during the past year with the *óxalis crenáta.*

Statistics of Gardening.

Botanical Collectors.—We are happy to find that the Horticultural Society, after a pause of several years, has revived a practice which has been attended with so much success; viz. that of sending out botanical collectors. In October last, M. Theodore Hartweg, the son of the late M. Hartweg, director of the Botanic Garden at Carlsruhe, sailed from Liverpool for Vera Cruz; whence he will proceed to Mexico, and remain there three or four years, collecting specimens, and other objects of natural history, all of which will be sent home to the Horticultural Society. From the Kew Gardens, a collector was sent out to South America during last year. Mr. Knight of the Exotic Nursery, King's Road, has also a collector in that part of the world, chiefly in search of *orchideæ;* and Mr. Low of the Clapton Nursery lately had our correspondent Mr. Henchman as a collector in Demerara, and still has Mr. Anderson as a resident collector in Australia. The Earl of Mount Norris, we have elsewhere stated, has sent out a gardener to collect in New Zealand; and Mr. Bateman, who obtained so many new *orchideæ* through Mr. Colley, has, we believe, sent out another collector, in pursuit of the same objects. We are surprised that no collectors are sent out to California, and to other parts visited by Douglas; where, as stated in our biographical notice of that indefatigable botanist, it is known that there exist many plants, not yet introduced, of which he sent home specimens, but could not procure seeds; or, having procured them, was unfortunate enough to lose them, or even, as he himself has told us, to be obliged to eat them, for want of other food.

Provincial Botanical and Horticultural Societies and Exhibitions continue to prosper, and even to increase, since the summary view of their exhibitions given in our last volume. We refer to an article headed 'London Horticultural Society and Garden', to show the increase of visitors to the exhibitions of the society, and the excellence of the articles exhibited. The most interesting provincial show of the season appears to have been that at Sheffield, which attracted commercial and private gardeners from almost every part of England, and from several parts of Scotland; above 150 master-gardeners, and more than that number of journeymen, having been present. The substitution of books and articles of plate, as prizes, instead of medals, is an improvement which is taking place generally both in the London and provincial societies.

Public Gardens. We have noticed, in various places, the progress making in the establishment or projection of zoological gardens; and the circumstance of the Bristol Zoological Garden being finished, and a plan published. The provincial botanic gardens, and the gardens of provincial horticultural societies, are, in general, in a prosperous state. In the garden of the London Horticultural Society some new pits are constructing, and the tent for the exhibitions has been extended. In the Royal Gardens at Kew a new palm-house is nearly completed; and in the Botanic Garden at Oxford various improvements are making, under the direction of the active and profoundly scientific professor of botany, Dr. Daubeny, and the superintendence of the excellent curator, Mr. Baxter. The new Liverpool Botanic Garden is completed; and considerable progress is making towards the removal of the Cambridge Botanic Garden to a more eligible site. The public garden at Gravesend is completed. At Exeter, some public walks have been commenced; and we have just seen a plan, by Mr. Forrest, which has been approved of, for the Cheltenham Zoological Garden. In the Edinburgh Botanic Garden, the erection of additional hot-houses, so as to complete the splendid range which forms such a fine object in that establishment, is nearly finished; and we hope, in our next volume, to give a plan and elevation of it; with, possibly, an isometrical view of the whole garden, like that given of the garden of Canonmills Cottage. The Glasnevin Garden is undergoing most important improvements, under the curatorship of Mr. Niven, one of the most active and intelligent gardeners in Ireland. Mr. Niven expects shortly to be able to carry into execution the plan for a natural arrangement, which he obligingly furnished us with some months since, and which will be found in the present volume. The report of Mr. Niven on this garden, made in November last, is of very great interest; and we regret we are obliged to defer its publication for want of room. A great many cemeteries are projected in different parts of the country: that at Kensall Green, near London, is in a highly prosperous state; and, independently of its use as a burying-ground, it is rapidly becoming a school of improvement in architectural taste, and of instruction in trees and shrubs.

Private Gardens. Those private gardens, the improvement of which is most likely to be noticed in this summary, are, such as are so extensive, and so well known, as almost to entitle them to be considered public. The greatest encourager of gardening in England, at the present time, is, without doubt, the Duke of Devonshire: he has already planted the extensive *arboretum* described in our former volume, and is now erecting a house for palms and other tropical plants, which, it is said, is to cover nearly an acre of ground. The plan and elevation of this house may be compared to those of a cathedral, the central ailes being wider and higher than the two side ailes. The roof is of the ridge and furrow kind, first described in our remarks on hot-houses (4to, 1816, p. vi.), and which is admirably calculated for uniting strength with lightness. The Duke of Devon-

shire's large house is expected to be completed in the course of the year 1838.

The next greatest improvements making in private gardens are those at Woburn Abbey; where the Duke of Bedford has recently completed a large rustic structure for the protection of araucarias during winter, and where an extensive range of glass, including a palm-house, has been commenced. The beauty, and high order and keeping, of all the gardens of the different persons belonging to the Woburn Abbey establishment, including the cottage and village gardens, are beyond all praise; and we are not aware of any landed estate, of similar extent, on which it is equalled. Extensive improvements are making at Bagshot Park, by the Duchess of Gloucester; at The Deepdene, by H. T. Hope, Esq; and at Gunnersbury, by Mrs. Rothschild. In the grounds of different noblemen's and gentlemen's residences throughout the country, many alterations are going forward under the direction of Mr. Nesfield, a landscape-gardener who only requires to cultivate a botanical and horticultural knowledge of trees and shrubs to place him at the head of his profession. Mr. Nesfield perfectly understands the difference between the picturesque and the gardenesque; between fac-simile imitation of nature, and imitation on artistical principles; and between lowering and caricaturing real scenery, and elevating and ennobling it. The pervading error of one class of landscape-gardeners (those, viz: who have arisen from being painters) is, that of arguing, or seeming to argue, that there is only one kind of beauty applicable to natural scenery, viz: the picturesque; and the pervading defect of those landscape-gardeners who have arisen from being cultivators is, that they do not know correctly what constitutes either the picturesque or the gardenesque. The error of supposing that the only kind of beauty adapted for garden scenery is the picturesque, was a very natural one to fall into in the early days of Price and Knight, after the long prevalence of the very opposite kind of beauty in garden scenery, viz: the geometresque, or the architecturesque, if we may be allowed these terms. At present, however, the picturesque is found to be only a beauty among other beauties; and, though appropriate for some kinds of artificial scenery, such as extensive parks, dells, dingles, &c., it is much less adapted for scenes of cultivation, such as shrubberries, lawns, and flower-gardens, than the gardenesque; and by no means so suitable for the immediate vicinity of a mansion as the architecturesque. It is a happy circumstance when the architect and the landscape-gardener operate harmoniously together; and this has been, and is long likely to continue to be, the case with Mr. Nesfield, and his brother-in-law, Anthony Salvin, Esq., architect. The latter is an artist of real genius; and, though not regularly initiated in the profession of architect, and still a young man, he is, perhaps, next to Mr. Barry, more extensively employed by country gentlemen than any architect in England. Another landscape-gardener who has been, and continues to be, extensively employed, is Mr. Forrest, than who no artist in England is more thoroughly acquainted with the executive part of his profession; and particularly with the various kinds of trees and shrubs adapted for different soils and situations, without attending to which, the execution of the most elegant design would lose half its interest. As a garden architect, we know no man to be compared with Mr. Forrest. Among many examples, in different parts of the country, we may refer, as a standing proof of his abilities in this department of his profession, to the admirable range of forcing-houses and pineries erected in the kitchen-garden at Syon (see the plan, &c., vol. v. p. 509,) and to the walks and general arrangement of that garden. Mr. Forrest has, also, had more experience in laying out zoological gardens and *arboretums* than any other artist.

Commercial gardening, taking the country generally, is in a more prosperous state than it has been for some years; though, as we have elsewhere observed, a large portion of the business of the metropolitan nurserymen is transferred to the provinces; a change which cannot fail to be highly beneficial to the public as a whole, and ultimately so even to the metropolitan nurserymen, by increasing their wholesale business with the trade in the country.

The nursery business in the neighborhood of London, to be carried on with success, must now be established on a different principle from what it was formerly; and, instead of the main object being to get business by keeping an extensive stock, and by travelling through the country to solicit orders, it must be sought by having the articles composing that stock true to their names, and by exhibiting specimens not only of fruits and flowers, but of all the more remarkable trees and shrubs, to gentlemen and country nurserymen who propose becoming purchasers. Facilities must also be given to young gardeners to acquire a greater knowledge of the articles grown and sold by nurserymen, than they have hitherto enjoyed; otherwise, how is it possible that they can order them after they have entered on situations as head gardeners? The London nurserymen, in short, would do well to take a hint from the horticultural and agricultural exhibitions made by some of their brethren in Scotland. Mr. Forrest, who (as observed in a future page) has lately commenced nurseryman at Kensington, appears to us to have set out in a manner likely to be attended with success. In the first place, he undertakes, with the name of every plant, seed, or root, which he sends out, to add the authority for that name in the manner done by Messrs. Audibert of Tarascon. Secondly, he intends having specimen plants of all the hardy trees and shrubs, and, as far as practicable, of all the fruit trees and fruit shrubs, which he sells. Thirdly, he intends, in every month of the year, to exhibit in his shop gathered specimens, correctly named, of the best fruits, flowers, flowering plants, and culinary vegetables, which are in perfection at that particular season; so that, by visiting Mr. Forrest's shop, any person, though totally ignorant of the art of gardening, may become acquainted with every useful gardening production which the open air of this country will afford; and will know the season, or the different seasons, at which each production will arrive at perfection. Fourthly, he intends to have a collection of garden implements, machines, utensils, and articles used in gardening, foreign and domestic, both for show and for sale. This was the practice about a century ago, as may be seen by the gardener's calendars and nurserymen's catalogues published about that time; but the practice

has gradually been left off, and, in consequence, the sale of garden implements has fallen into the hands of iron-mongers and agricultural implement makers, to the injury of the young gardener, who has thus no opportunity of seeing any tools, but those used in the garden where he is at work. Fifthly, he proposes to have a library of reference of the best gardening and botanical works; and he intends to keep a small stock of all such works, and to sell them to working gardeners at very little more than the trade price. Sixthly, in the library of reference he will place his own very complete *hortus siccus*, and collect specimens of seeds, fruits, cones, &c., of useful and ornamental trees and shrubs; and also specimens of woods, commencing with a copy of the *holz bibliothek* from Germany. And, lastly, he intends to devote a room to the use of young gardeners, either working in his nursery, or elsewhere, for them to meet in to read, discuss, or otherwise to improve themselves; the young men being at the expense of their own fire and candles, and paying a small sum per volume for the loan of books.

Mr. Forrest will not be able to accomplish all these things at once; but such is his activity of mind, his ambition, and his perseverance, that, if health permits, we have no doubt he will carry the whole into effect, and that sooner than any other man we know.

In no article sold by seedsmen has there been a greater increase of consumption, during the past year, than in that of bulbous roots, which are now imported from Holland to more than double the extent to which they were seven years ago. Of all the flowering plants in existence, bulbs are the best adapted for small gardens, for street gardens, and for all gardens that are not under the care of a professed gardener. They are desirable for street and suburban gardens, because they flower early in the season; and gratify the citizen at a time when the distant country is less inviting than during summer and autumn, when he may leave his town or suburban residence for a watering-place or a villa at some distance; and they are desirable to all gardens whatever, because they are certain, with little or no care, of flowering well for the first year at least; and, with very little care, for several years in succession. The transactions between the London and American nurserymen and seedsmen continue greatly to increase; and we only regret that country gentlemen in Britain are not aware of the very low prices at which American tree seeds may be purchased in London, and by which they might add some hundreds of new species to their collections, at a far cheaper rate than they could do by purchasing plants. The only difference between seeds and plants is that of time. The connexion between British nurserymen and those in France and Germany is steadily on the increase; and what will contribute to this perhaps more than any thing else is, the now greatly extended cultivation of the English language in Germany, and of the German in England. Continental gardeners, and the sons of French, German, and Dutch nurserymen, are now very frequently to be met with in this country, either on a visit, or on immediate business, or residing here for improvement. In the course of the past year, the gardener of Prince Metternich made a tour of upwards of two months through the different counties of England at his master's expense (see p. 550;) and Mr. Rosenthal, the son of a Vienna nurseryman, now resident in this country for his instruction, has visited a number of gardens and nurseries, not only in England, but in Scotland and Ireland. A New York nurseryman has had his son for some years in Paris with M. Vilmorin; and the son of a London seedsman is now working in a garden in the neighborhood of Paris. Mr. Booth of Hamburgh makes a commercial journey through Great Britain and Ireland every year.

The condition of gardeners may, we think, be considered as improving rather than otherwise; partly from the great general prosperity of the country, and partly from the increasing knowledge in gardening of the employers of gardeners: since nothing can be more certain than this, that the more a proprietor knows of gardening, the more anxious will he be to employ a first-rate gardener; and this, too, whether his garden be large or small. However paradoxical it may appear, it is, nevertheless, strictly true, that to manage a place of great extent does not require one whit more gardening skill than than to manage a very small place, even one of a single rood; supposing the object to be to bring the gardening of both places to the highest degree of perfection. But to manage the large place, other qualities in the gardener are required, in addition to those of a knowledge of his art; such as forethought, unity of design in contriving work, and system and vigilance in the management of men, and in otherwise carrying work into execution. These are qualities totally distinct from a knowledge of gardening, and may, and often do, exist in an individual who is below mediocrity in his profession; while, on the other hand, a man may be a first-rate cultivator, and yet below mediocrity in comprehensive views. and in a system of management. When the beauties and enjoyments of gardening come to be duly appreciated by the employers of gardeners, those who have small places, of a quarter of an acre or less, will be just as anxious to have first-rate gardeners to manage these places, as those who have a walled-in garden, and pleasure-grounds of one hundred acres. For example, to make the most of our garden here at Bayswater, which, exclusively of a few square yards for culinary crops, is only fifty feet by one hundred and sixty feet, would require a man with just as much scientific and practical knowledge of gardening as Mr. Paxton, head gardener to the Duke of Devonshire, who has, perhaps, 2000 acres under his care; or as Mr. Marnock, curator of the botanic garden at Sheffield, who has the management of one of the most extensive botanical and horticultural establishments in the country; though, in these two last situations, higher qualities of mind would require to be added, than could ever be brought into use in taking care of our garden, in order to insure proper general management. Hence it follows, that, as a small garden requires as much gardening knowledge as a large one, all gardeners whatever ought to be highly educated and scientific men; and that all ought to have certificates as to their physiological and physical knowledge. This will raise the gardener in the scale of society; and, as the love of gardening and agriculture takes the place of the love of dogs and horses in country gentleman, and the cultivation and improvement of a man's own estate or farm, affords him a deeper interest

than hunting or shooting, driving or gambling, the enjoyments of gardening and farming will be more highly prized, and the professions of gardener and of farmer will be more respected. Whoever will give himself the trouble of comparing what passes at the meetings and exhibitions of the provincial horticultural societies with what was transacted at similar meetings ten years ago, will be convinced that such a change is gradually taking place.

Obituary.—Among the eminent men connected with botany and gardening who have died in the course of the year, are the celebrated Jussieu, the founder of the natural system of botany; Deleuze the historian of the introduction of ornamental plants into European gardens; Richard Cunningham, the colonial botanist at Sydney; and Dr. Hosack of New York, the founder of the Elgin Botanic Garden, in the neighborhood of that city. Besides these, we have lost Sir John Sinclair, one of the greatest agricultural and economical writers that has ever appeared, and an active-minded and benevolent man; and the Rev. Henry Berry, proprietor and editor of the '*British Farmer's Magazine*,' and an excellent judge of live stock. Among the practical gardeners who have died during the last year may be mentioned, Mr. Malcolm, Mr. Young of Epsom, and Mr. Falla of Gateshead, all eminent nurserymen. Some further particulars respecting the death of the lamented Douglas, proposals for erecting a monument to his memory, and a biographical notice of him in three languages, will be found in the present volume. We are happy to find that the intention of erecting a monument to the memory of this botanical collector, to whom gardening and botany are so much indebted, has excited the sympathy of gardeners both at home and abroad. No very large sum will be raised; because the subscriptions, though numerous, are limited to very small sums; and it is not to be supposed that the same exertions will be made to erect a monument, as would have been done if Douglas had left a wife and family to be provided for, or, indeed, any one dependent on him. Enough, however, will be collected to show the respect in which his memory is held; and to do this has been our great object in furthering the subscription, both at home and abroad, to the utmost of our power. It is highly gratifying to us to observe the spirit with which this subscription has been entered into at Paris, Vienna, Berlin, and Gottingen. (See '*Annales de Fromont*,' and Otto's '*Garten Zeitung*,' vol. iii. p. 294.)

Garden Literature.—A work on landscape-gardening, by Prince Puckler Muskau, from which we have given copious extracts, contains some remarks which may be useful in Germany; but the work is strikingly deficient in every thing that relates to fundamental principles which would be of universal application. Dennis's '*Landscape-Gardener*' is written with great carelessness, considering that its author is a clergyman, and is of little value in either a scientific or a practical point of view. The best agricultural work which has appeared in the course of the year is Lawson's '*Agriculturist's Manual*,' which every gardener who acts as a farmer or land steward ought to procure. Two new botanical periodicals have been commenced, viz: the '*Birmingham Botanic Garden*' and the '*Botanist*,' and the '*Floricultural Magazine*,' by Mr. Marnock of Sheffield, adds another to the number of provincial magazines already in existence. The excellent work of Mr. Royle, on the '*Botany of the Himalayan Mountains*,' &c., of which nine parts have already appeared, and will be completed with the tenth part, at the end of the year. Of the foreign garden literature, it may be sufficient to observe, that with the exception of a work on fruit trees by Van Mons, and Otto's '*Garten Zeitung*,' there have been very few books published, either in France or Germany, that are not mainly made up of translations; or, as in the case of the '*American Gardener's Magazine*,' of verbatim copies of articles from English books.

Rural improvement generally.

Agriculture is certainly in a prosperous state in Scotland; and from the increasing intercourse between the influential encouragers of agriculture in England and the first agriculturists of the north, great improvements may be anticipated throughout both countries. *

The observations on the subject of agricultural improvements, by Mr. Shaw Le Fevre, quoted in a future page, under general notices, are remarkable for taking a new and masterly view of what is called agricultural distress, and showing that the only permanent remedy for that distress must be

* Mr. Handley, well known for his exertions, with a view to promote the employment of steam in cultivating the soil, in a speech made at the public dinnner of the Highland Society of Scotland, in October last, adverting to the present state of agriculture in England, expressed a wish that a "public body like the Highland Society of Scotland existed there, to stimulate the activity of the farmers, and take the lead in improvement." He hinted, and the '*Scotsman*,' from which we quote, adds, he "might have stated in the broadest terms, that such an institution would do more good to the landed interest than fifty parliamentary committees. The value of the Highland Society is not to be measured by the premiums it bestows, or the immediate effects of its patronage; but by the spirit of improvement which it spreads abroad, and the activity it gives to the circulation of useful ideas among a class of men whose situation renders them, in most countries, the slaves of prejudice and routine. So rapid and easy have the means of communication now become in Scotland, and so numerous are the intelligent active minds stationed in every quarter of the country, that any useful discovery, in husbandry or the kindred arts, will find its way from Maidenkirk to John o' Groat's, in half as many months as it would have required years at the end of the American war. It is a striking fact, in illustration of the want of a great institution of this kind in the south, that every year new inventions applicable to agriculture are sent from various parts of England, to the Highland Society, as the best means of bringing their merits into notice. If Mr. Handley's sentiments are shared by his countrymen generally, the want may, perhaps, soon be supplied; and, if the attempt is made, there is one piece of counsel we would tender to the parties concerned in it: it is, to follow the example of the Highland Society, in carefully excluding, not only all political topics, but all theoretical questions upon which a division of opinion exists. Had the Highland Society engaged in discussions about the wisdom of the corn laws, or the propriety of abolishing the malt tax, it would soon have made one half of the people its enemies, and its utility would have been at an end. The improvement of agriculture, *as an art*, presents an ample field for the employment of its funds, and to this it wisely devotes itself." (*Scotsman*, Oct 12. 1836.)

found among the farmers themselves. The employment of steam in agriculture seems to be no longer a chimera, as it was thought to be at the time when we first mentioned the subject in our third volume. We refer to the article "ploughing by steam," p. 488.; and to various subsequent paragraphs on the subject in this volume. The editor of the '*Scotsman*' truly observes that, "if even half the advantages of the steam plough are realized, some millions of acres of bog in Scotland will be reclaimed, and the arable surface of that country doubled; and we have seen in p. 489, that abont 3,000,000 of acres would be added to the arable surface of Ireland."

The important uses of the Deanston subsoil plough (see p. 1308, fig. 1187, of the '*First Additional Supplement*' to our '*Encyclopædia of Agriculture*,' cannot be too strongly impressed on the minds of gardeners as well as farmers; because loosening the subsoil, without bringing it to the surface, is fully important to gardeners, especially in arboriculture, as it is to farmers in agriculture. *

Another agricultural improvement, perhaps of equal importance to the use of the subsoil plough, is the system of thorough under-draining adopted in Scotland. This system will be found described in the '*Quarterly Journal of Agriculture*,' vol. vi. p. 325, and 515.; and also, in a concise and masterly manner, in Mr. Le Fevre's '*Report*.' To Mr. Smith of Deanston, is also due the invention of this improved mode of effectually draining land; and his plan will be found noticed in our ninth volume, p. 448., and given at length in the '*First Additional Supplement*' to our '*Encyclopædia of Agriculture*,' p. 1347.

The greatest agricultural novelty of the past year is the cultivation of beet for the purpose of manufacturing sugar. We refer to a paragraph on this subject in a future page; and, also, to an article in the *Brttish Farmer's Magazine* for Oct. (1836 vol. x. p. 369.) We cannot conceive it possible that this manufacture should answer in any country where there is a trade in the sugar of tropical climates, subject to only a moderate duty; but more especially in this country, where, we should think, there is not a sufficiency of solar light and heat to produce a maximum of sugar in any plant whatever. It is possible, however, that we may be mistaken in this supposition, since it is alleged that more sugar is produced from a given qnantitity of beet-root grown in the temperate parts of France, than in that grown in the warmer provinces of that country; and since we know that the cultivation of the beet, as a sugar plant, has been tried in the Isle of France, and turned out far from satisfactory. While this is passing through the press, we find that the French have succeeded in procuring potash from beet, in the proportion of one sixth part to that of the sugar which the root yields.

The exhibitions of agricultural and horticultural produce, by the seedsmen of Edinburgh, Stirling, and Perth, are continued, as usual, with the same successful results; and the 'Highland Society,' who hold their exhibitions in different parts of Scotland, had, this year, the one before mentioned in the month of October, at Perth, which was remarkably well attended by the practical farmers of that district, and by many proprietors from different parts of Scotland, and also from England. The partial failure of the potato crop, for three successive years, in many parts of Scotland, and also in several districts both of England and Ireland, has called forth various remedies; the most rational of which appears to us to be, that of burying the tubers intended for sets in thin layers, mixed with soil, in a cool cellar, or in thoroughly drained soil, in the open air, where they will be kept plump, till wanted to be cut into sets. Taking up the tubers before they are quite ripe, and exposing them, thinly strewed on the ground, to the action of the atmosphere, will be found a useful adjunct to this practice. After the tubers are cut into sets, care should be taken never to let them lie together in such quantities as to endanger their heating. The supposition of insects being a cause of failure of the sets, and, also, that the kinds and varieties in cultivation are worn out, appear to us alike unsupported by facts. Insects seldom attack either plants or animals till they are in a state of disease or decay; and there is no reason to suppose that healthy sets from a healthy potato, of any given variety, or healthy cuttings of any healthy variety of willow, poplar, or vine, will not produce healthy plants to the end of time.

The most curious piece of agricultural quackery, which has occured during the past year is, the success which has attended the sale of the seed of the variety of borecole called the cow cabbage, which has been brought forward under the highly sounding name of the "Waterloo Cæsarean evergreen cow cabbage." (See p. 441.)

* To show how well the use of the Deanston plough is understood by Mr. Shaw Le Fevre, we quote his own words—"Smith's subsoil plough is a necessary accompaniment to draining; and, when that is done effectively, it seems calculated to render the most sterile and unproductive soil fertile and profitable. There is no difficulty more fatal to the practical farmer than that of cultivating a thin shallow soil with a stiff retentive subsoil. Whatever pains may be taken with the tillage of the former, however expensive the dressing which may be used in its cuitivation, the nature of the subsoil will always counteract its beneficial effects. Many persons have endeavored, by trenching, to obviate this difficulty; but, where the subsoil is of that sterile nature which requires exposure to the atmosphere for a long period to make it productive, few farmers have been found bold enough to repeat the experiment. Mr Smith's most ingenious invention, by breaking the subsoil without bringing it to the surface, renders it pervious both to air and water. The same chemical changes which take place in a fallow, owing to its exposure to the action of the wind and rain, are thus brought into operation in the subsoil, whilst the surface soil is in the ordinary course of cropping; and when, after a few years, by a greater depth of ploughing, the subsoil is mixed with the upper soil, it is found to be so completely changed in its nature as to be capable of producing every kind of corn.

"The advantages of this system of husbandry are so apparent, that no farmer will be at a loss to appreciate the merit of the invention. I believe it to be quite as important an improvement in the management of clay lands as the introduction of the turnip system has been with reference to light soils; and, as the experiment has been tried for twelve years, and with uniform success, I cannot but anticipate its ultimate adoption in those districts of England where, from the cold retentive state of the soil, the greatest extent of agricultural distress has hitherto prevailed, and where draining is essential to preserve the soil in a state of cultivation." (*Le Fevre's Remarks on the present State of Agriculture, &c.*)

In agricultural science, the only point that we can recollect worthy of notice, that has occurred during the past year, is the advancement of the principle, by the American agricultural writer, Mr. Ruffin, that no soil whatever will continue fertile, for any length of time, that does not contain calcareous matter. This, we believe, was never distinctly stated as a principle by Kirwan, Chaptal, Davy, or any other European chemist or agriculturist. We refer to the review of Mr. Ruffin's book, in p. 156.; and those who wish to peruse his work entire will find it copied in vols. viii. and ix. of the '*British Farmer's Magazine*,' where it is given as a series of original communications to that periodical! New agricultural machines are every year coming into notice, and others every year falling into disuse. Such, we may readily anticipate, will be the fate of the mill for chopping turf, noticed in a future page, which affords a fine example of the application of main force, instead of skill, in the improvement of agriculture. A syphon to facilitate the milking of cows has been patronized by the 'Society of Arts;' and may, probably, lead to some useful purpose. At the meeting of the 'Highland Society of Scotland,' at their great agricultural show, held at Perth, on October 7, a trial was made of two reaping machines; the one the invention of Mr. Smith of Deanston, and the other of our correspondent, Mr. Bell. Mr. Bell's machine clips, by means of fourteen pairs of scissors (see the engravings and description of this machine in vol. vi. p. 296); and Mr. Smith's cuts, or mows, by means of a circular plate with a sharp edge. (See the description and engraving of this machine in our '*Encyclopædia of Agriculture*,' second edition, p. 422.) Both these machines seem to answer; but which is the most likely to come into general use, does not appear from the report of their trial. A gentleman who was present, however, M. Rosenthal of Vienna, now in London, informs us that Mr. Bell's machine did decidedly the most, and the best work. (See the '*Constitutional, and Perthshire Agricultural and General Advertiser*,' for October 8.) An economical mode of forming furrow-drains, and of making draining tiles of peat, will be found in the '*Quarterly Journal of Agriculture*,' for September last (vol. vii. pp. 244. 256).

Rural Architecture is making considerable progress in every part of the country; and the 'Highland Society of Scotland' have lately adopted an admirable mode of improving both cottage architecture and cottage gardening; viz. that of offering premiums for the neatest cottages and the best kept gardens; and limiting the competition to particular districts, and even, in some instances, to particular parishes. This mode of making the competition for premiums local, deserves the particular attention of all societies the object of which is rural improvement; and it shows the much greater advantages to be derived from provincial societies of every kind, than from central societies alone, however wealthy and powerful the latter may be. This is admirably illustrated both in the case of the provincial horticultural societies, and in that of the 'Highland Society.' What effort of the 'London Horticultural Society,' for example, could have produced the results which we see in Cornwall, Jersey, Yorkshire, and a hundred other places more or less remote from the metropolis? The 'Highland Society,' for several years, had offered premiums for improvements in cottages; but, as the competition extended to the whole of Scotland, it produced no result; for a competitor in those places where cottage-building was in a backward state, though he might produce a far better cottage than any of those in his vicinity, might yet find his cottage as far behind those in another district, as it was in advance of those around it. A great improvement in agriculture, and in rural matters generally, has taken place in Scotland since the 'Highland Society' have adopted the plan of holding their shows in different parts of the country; and this has taken place precisely on the principle above mentioned; viz. that of stimulating locally one part at a time, as well as in endeavoring to stimulate the whole country at once.

The improvement of furniture, domestic utensils, and clothing is still kept in view by the government; and a '*Report of the Committee of Arts and Manufactures*,' forming a thick folio volume, with illustrative plates, has just been published. A summary of this '*Report*' will be found in the '*Architectural Magazine*,' for December, 1836. A gardener would not expect to find much in this '*Report*' that would be of any direct use to him; but in this he will be mistaken. In vol. iii. p. 250. of this Magazine will be found an article compiled by us from a lecture given by Mr. Reinagle at the 'Royal Institution,' "On the Original Beauty of Lines and Forms," which will, we think, be allowed to be extremely interesting and valuable to any gardener who professes to lay out grounds. Now, in the '*Report*' referred to (p. 51—53.) Mr. Reinagle has given the essence of his system, illustrated with figures.

Railroads.—The number of railroads and common roads, in progress or projected, cannot fail to have a wonderful influence on the general improvement and prosperity of the country for many years to come. The grand and characteristic effect of railroads is that of equalization. Not only will the value of landed property be rendered comparatively the same every where; but the comforts and enjoyments of each particular class of society will be comparatively raised to the same level. An immediate effect of the completion of every line of railroad will be, the erection along its margin of numerous villas; and thus rural architecture and landscape-gardening will be called into exercise, and displayed to advantage. The prosperity of the country, it is now generally acknowledged, has been promoted by the working of the 'New Poor Law;' and we look forward to the establishment of a rural police as a beneficial public measure.

An improvement which, we think, would be second only to that of the railroads, and before them, as far as gardeners are concerned, would be the equalization of the slopes of public roads; a subject on which we have already said much in different volumes of this 'Magazine.' (See vol. vii. p. 450, and vol. xi. p. 627.) Were all hilly roads reduced, so that no part of their surface were steeper than the steepest parts of the Holyhead road, viz. one in thirty-six, it would be as easy for three persons to travel from one point to another in a gig, or any two-wheeled carriage with one horse, as it is now with a four-wheeled carriage and a couple of horses. This would

greatly facilitate gardeners in visiting one another; and would enable many, who now seldom leave their own neighborhood, or see only those gardens, which they can approach by stage-coaches, to inspect the principal gardens throughout the country. This they cannot do by travelling by stage-coaches alone, because many of the first-rate gardens are situated at a distance (too far for walking) from the main roads. We have often had occasion to regret the loss which foreign gardeners who have come over to this country solely for the purpose of visiting our gardens, have sustained from this circumstance; it being a well-known fact that a person may be conveyed fifty miles on a stage-coach along a main road, for less than he can go five miles in a post-chase, or in a gig, on a cross road. Another improvement, which would greatly facilitate the travelling of the working classes, including both artizans and artists, would be the removal of all turnpike-gates, and the taking off the present heavy tax on stage-coaches and gigs, and on horses drawing in them. Stage-coaches and gigs are the carriages of the middle and working classes; and by means of them nearly all the important business of the country is transacted. Let the taxes, therefore, be removed from them, and placed on the post-chaises, and other carriages of the wealthy. Another improvement which we should like to see take place, is the increased stability of every description of public carriages by widening them, and allowing no luggage whatever to be placed on the roof, or even above the level of the axle-tree. There ought, also, to be a law to regulate the number of outside passengers, the rate of driving, and the length of stages, so as to lessen the great number of coach accidents which annually occur. (See an excellent article on this subject in the '*Scotsman*,' October 12, 1836.)

Gardening and rural improvement in foreign countries.

In *France*, in the 'Jardin des Plantes,' a new palm-house has been completed, and the hot-houses in that establishment generally have been altered and improved. The new variety of mulberry, *morus multicaulis* (see '*Arboretum et Fruticetum Britannicum*,' art. *morus*) has been lately extensively propagated by the nurserymen, both for planting in France, and for exportation to America and other countries. The *maclura* has ripened fruit at Lyons and Marseilles; and the leaves have been employed to feed the silk-worm in the latter place. Young plants of the Salisburia have been raised from fruit produced in the neighborhood of Montpelier. All these facts will be found in detail, at more length, in their appropriate departments in this Magazine. (See 'Foreign Notices,' in the table of contents.)

Holland, in consequence of the increased commerce in bulbus roots, and the quantity of melons, grapes, and other fruit grown in that country, and sent annually to the London and Brighton markets, may, we conclude, be considered as prospering in a gardening point of view. The celebrated Botanic garden at Leyden, is still carefully kept up, as appears by Professor Reinwardt's letter, in a future page.

In Belgium, we understand, few horticultural improvements are going forward; and we regret much to learn that the botanical and horticultural garden at Brussels, is still suffering from want of funds. Gardening seems rather in a more prosperous state in the neighborhood of Ghent, where our correspondent, Mr. Maddison, informs us, a hall for horticultural exhibitions has been erected. A valuable communication from Mr. Maddison, on this subject, will appear in our succeeding volume.

Germany.—A number of plants, new to the gardens of Vienna, have been sent thither from Swan river, and from the south coast of New Holland, by Baron Hügel. just returned from a scientific voyage to the East Indies and New Holland; and Prince Metternich's gardener has, also, introduced several new species, which he carried with him from England. (See 'Otto's *Garten-Zeitung*,' vol. iv. p. 199.) The grand centre of landscape-gardening and architectural improvements, in Germany, continues to be Munich, where the English garden has recently undergone various changes, and an Ionic temple has been raised on the summit of an artificial mount, and finished interiorly with polychromic, or many colored, paintings. This new and singular mode of interior finishing is at present engaging the attention of architects throughout Europe. It seems a revival of an art practised by the ancient Greeks on, and within their temples, and continued through the dark ages, by painting the ceilings of cathedrals and churches with blue, and varying the surface with golden stars, the sun, moon, and other figures, and also by the stained glass of church windows, and the illuminated missals of the church. A detailed account of the process will be found in the '*Foreign Quarterly Review*,' for October, 1836; in the '*Transactions of the Institution of British Architects*,' vol. i.; and in the '*Architectural Magazine*,' vol. iv. A splendid new country house has been built by W. Von Marenholtz, at Wilhemsburg, near Brunswick (see '*Architectural Magazine*,' vol. iii.); but we have heard nothing respecting its gardens.

The botanical garden at Berlin is acknowledged to be the first in Germany. A correspondent (apparently G. Bentham, esq., secretary to the London Horticultural Society) of the '*Companion to the Botanical Magazine*,' writing, in August last, says of this garden, that it is, he believes, "still the most important in Germany in the number of species, trees excepted, in which respect the Vienna garden excels." "Californian plants," he adds, "thrive remarkably well in it." Speaking of the Hamburgh botanic garden, the same writer observes, that, "in point of situation, it is, next to Edinburgh, the most beautiful one I know. It occupies about sixty English acres, of which the greater part is on the old outer ramparts of the town, planted with a good deal of taste. The old town ditch is here broad, and the water clear. The walks and plantations come down to the water's edge; and on the opposite side, the bank is laid out as a promenade, with flower-beds, shrubs, and plantations that conceal all the town, except the end of a very handsome new street, which, from several parts of the garden, looks like a fine chateau in an extensive park. The whole circuit of the ancient rampart of Hambugh is, in the same manner, converted into promenades, full of flower-beds and of flowering shrubs, neatly kept, and perfectly open to the high road; which has a beautiful effect, especially near the large lake call-

ed the Alster. In a purely botanical point of view, the garden is chiefly rich in Cape plants, introduced by M. Ecklon, with a fair proportion of the Chilian and other new things, which have been much raised, of late, in German gardens; several very interesting Californian plants from the Petersburgh garden, and the ordinary quantum of ill-named, ill-defined garden species, which infest continental, and especially German, botanic gardens. Amongst the Cape plants, the most curious are the palms, introduced by Ecklon, and published by Professor Lehmann, under the name of *rakathia*. There are six or seven species, chiefly in small specimens; but, amongst those received last December, there are two or three, above eight feet high, that are now shooting leaves from the top. There is also a very extensive collection, lately introduced, of medicinal plants. The whole is kept up at the expense of the state or town of Hamburgh, and is open to the public, nominally, on certain days, at certain hours; but, really, all day, and every day, without fee or payment. It is under the immediate arrangement of an active and intelligent curator, M. Ohlendroff, and under the general superintendence of the professor of botany, Dr. Lehmann." ('*Companion to the Botanical Magazine*,' vol. ii p. 74.)

Booth's Nursery, at Floetbeck, near Hamburgh, the same writer observes, continues to be the first in Germany, and has received extensive additions since I last saw it, especially in the houses. It contains, altogether, 105 English acres at Floetbeck, and ten more at some distance. I was surprised to hear from Mr. Booth, that a great part of his commerce is now with America. This nursery is, however, also the great entrepot of the nursery commerce between Germany and England ('*Companion to the Botanical Magazine*,' vol. ii. p. 75.)

Denmark, Sweden and Norway.—A very interesting work has lately been published on Norway, entitled the '*Journal of a Residence*' there, by Mr. Laing; but, as the subject of it belongs more to agriculture and to general improvement, than to gardening, we shall pass it over, strongly recommending its perusal, as a work full of practical information, and of liberal and benevolent views. Some curious extracts from it, on the subject of the uses of the pine and fir tribe, will be found in our '*Arboretum et Fruticetum Britannicum*.'

Russia.—It is in contemplation to erect a splendid palm-house in the Imperial Botanic Garden at St. Petersburgh; and Dr. Fischer, the director of that garden, has been some months in England, for the purpose of inspecting the different modes of construction, and of heating. We understand that Mr. Kewley is like to be employed for the latter purpose. A railroad is forming from the very centre of St. Petersburgh to the village Tzarskojeselo, and continued to the great park of Pawlowzk, of which details will be found in the '*Architectural Magazine*.' An agricultural school has been founded by the government in the province of Mohiloff, which will be found noticed in our succeeding volume.

In Poland, we have been agreeably surprised, during the past year, with the account of Count Wodzitzcki's *arboretum*, at Cracow, which has been established upwards of twenty years, and of which details will be found in our succeeding volume.

From Switzerland we have received some notices of remarkable trees, by Mr. Strutt, the eminent artist, who lately resided there; and we learn from other sources, the botanic garden of Geneva, is in its usual state. The paper, by M. Adolphe de Candolle, on the ligneous flora of Switzerland, given in this volume, will be read with interest.

From Italy we have received some most interesting communications, from our highly scientific and intelligent correspondent, Signor G. Manetti, which will be found under their appropriate heads. There can be no question that gardening is in a prosperous state in Lombardy. In the kingdom of Naples, we are informed by an English gentleman, who has resided there many years, that very great general improvement has taken place, in cosequence of excellent Macadamized roads having been formed all through the interior of the country. It is now practicable, in the kingdom of Naples, to live in a country house apart from a village or a town; which was not the case till these roads were formed, and the banditti either employed on them, or deterred from pursuing their avocations, by the facility these roads afford of detection. It is difficult for a native of Britain, in the present day, to form an idea of the great additional comfort which such a state of things must be to the owners of property in the south of Italy. From Signor Manetti we have received, this autumn, a quantity of seeds of the Lombardy poplar, which we have distributed; and, if they should vegetate, and plants should be raised from them, there will doubtless be found among them, the female, which has not hitherto been introduced; the Earl of Rochford, in 1758, having only brought over cuttings of the male plant.

On the state of gardening in Spain, Portugal, Sardinia, Greece, the Ionian Isles, Malta, Gibraltar, and other parts of Europe, we have nothing to state. It is gratifying to find at Gibraltar a descendant from the family of Andrew Heron of Bargally, as noticed in a future page, imbued with the same taste as that eminent botanist and horticulturist, and cultivating there "florists' flowers," pelargoniums, and other cape shrubs, with the plantain of the tropics, and the raspberry of the north of Europe, all in the same garden.

From Africa and Asia, we are without gardening news; unless it may be considered as belonging to this head, that plants, in boxes covered with glass, and hermetically closed, have arrived safely, with all the plants alive, at Calcutta, from London; and at Messrs. Loddiges's, London, from Dr. Wallich, at Calcutta. (See p. 263.) The discovery of the tea plant in Assam, in great abundance, was announced in our preceding volume; and, as we have since learned that this immense tract of country abounds in botanical riches, we hope it may be found to contain many plants which are likely to prove hardy, or half-hardy, in the temperate climates of Europe and North America.

In North America, gardening, in common with every other description of rural improvement, is making rapid progress. Two magazines, exclusively devoted to gardening, are published, one in Philadelphia, the other at Boston; and, as we believe they have both reached a second volume, we may consider them as established. In these magazines, accounts are given of the improvements

made in the country seats of several men of wealth, and of various extensive ranges of glass, heated by hot water; and including all the modern European improvements. We refer to the other articles headed 'North America,' under our 'Foreign Notices.'

From the British West India Islands a new orchideous plant is occasionally received; but we have had no accounts lately of the progress of garden cultivation in that quarter; though, happily, the new law respecting the emancipation of the slaves is said to work well.

From South America Mr. Matthews continues to send home splendid specimens; and the 'Horticultural Society' of London, have lately sent to Mexico a zealous young naturalist, M. Hartweg, who will probably penetrate into Colombia. Engravings of some new species of pines and firs, brought from Brazil and Mexico by Dr. Coulter, are about to be published by Mr. Lambert.

Australia has lost the curator of the Sydney Botanic Garden, Mr. Richard Cunnigham; and a notice of the distressing manner in which he met his death, will be found in a preceding page. Mr. Allan Cunningham, the brother of the deceased, has been appointed his successor, and sailed from London, in October last. From the new colony established in Southern Australia, much is expected, in consequence of the adoption of the new principle of concentration; by which means, in a very short period, a distant colony may be made to unite all the essential advantages of an old country with those of a new one. This principle consists in government assuming the prorietorship of the land, and allowing no person to settle who does not become a purchaser, or an occupier at a fixed rent, and show that he has sufficient capital to bring what he purchases or hires into proper cultivation. It is easy to conceive that the application to this principle will have a tendency to produce a great number of small estates, all lying near together, and within easy distance of a town occupied by tradesmen and laborers, who will supply the wants of the agriculturists, in return for a portion of the produce of their farms. In such a colony, it will be long before there can be any overgrown estates; and it may probably grow up a second Norway, where every head of a family, among the rural population, is an owner of land, which he cultivates himself. A number of portable houses, such as those figured and described in our '*Encyclopædia of Cottage, Farm, and Villa Architecture*,' p. 251.; a portable school and church; and a portable banking-house, of two stories; have been constructed at London, and sent out to this colony, for the conveniance of the first settlers. Mr. Allen, an early correspondent of this 'Magazine,' has gone out as a nurseryman and garden architect; and we have already seen, in a South Australian newspaper, one of his advertisments, offering his services in laying out and planting small gardens. From the latitude of Southern Australia, we should expect the climate to be more analogous to that of Van Diemen's Land, than to that of Sydney; and, consequently, that it will be found better adapted for the health of British emigrants, and for the growth of British productions. The great article of export from Australia to Europe continues to be wool; but it is highly probable that, at no great distance of time, cotton and silk will be added. Wine and oil may doubtless be produced there in sufficient abundance for home consumption, if not for exportion.

HIGH PRICES OF DURHAM CATTLE.

[The following statement, (from the Chillicothe Gazette,) appears to us not so much an evidence of judicious and valuable improvements in stock farming, as an indication of the commencement of a speculating cattle-mania in this country, which will be at least equal in violence and effect to the merino-mania which raged about twenty-five years ago, and the high-blooded-horse-mania, which is raging in Virginia now.

The allusion to a "sham sale," below, has reference to an account of a sale of 50 head of short-horned cattle, which has recently been published in half the papers of the United States, and will be copied into the other half. That report is pronounced by the same paper to be false in sundry particulars—and it attempts an explanation of the mis-statements, which is any thing but satisfactory, and therefore not worth repeating here.]

"Seventeen head of improved short-horned cattle, belonging to the Ohio Company, being mostly of this year's importation and the produce of others, took place at the Sugar-Grove in this town on Tuesday last, [Oct. 24.] The attendance was numerous, comprising a larger number of actual bidders than the previous sale. Among the individuals present who are pre-eminently noted for their agricultural enterprise, were Governor Vance Ex-Governor Trimble, the Messrs. Renick, Mr. Sullivant, and indeed nearly all of the large farmers of this valley and the adjacent country. The bidding was consequently very spirited, and the prices obtained for the cattle plainly show, that the kind of stock sold, is rapidly advancing in public estimation. By the following list from the auctioneer's book, our brethren of the press will discover, that the cattle enumerated were even more highly valued than those of the *sham sale* they were of late parading in their columns, copied from the Cincinnati Gazette.

Bulls.

Acmon, 3 years 8 months, M. L. Sullivant & Co., Columbus, $2,500

Comet Halley, 5 years, George Renick & Co., Chillicothe, $2,500

Hazlewood, 1 year 6 months, Allen Trimble and R. R. Seymour, $700

Bouncer, 1 year 7 months, John Walke, Pickaway county, Ohio, $453

Powhatan, 1 year 19 days, Harness Renick, Pickaway county, Ohio, $500

Santa Anna, 3 months 21 days, Joseph C. Vance, Ohio county, Va., $425

Cows.

Flora, 7 years 6 months, M. L. Sullivant, Columbus, $1,300

Matilda, 6 years 6 months, Allen Trimble, Highland county, Ohio, $1,220

Fidella, 7 months 18 days, Allen Trimble, Highland county, Ohio, $610

Elizabeth (and calf,) 5 years, J. & Wm. Vance, Champaign county, Ohio, $1,450

Charlotte, 4 years 7 months, Joseph G. White, Ross county, Ohio, $630

Arabella (and calf,) 3 years 7 months,	$1,200
Blush, 2 years 9 months,	$1,015
Emily, 2 years 8 months,	$875
Victoress, 1 year 9 months,	$700

THE MARL OF VIRGINIA NOW IN USE IN CONNECTICUT.

In the October No. of Silliman's 'Journal of Science,' in an elaborate review of Prof. Sephard's, 'Report of the Geological Survey of Connecticut,' there is stated, in the following words, an important agricultural fact, the details and progress of which we should be much gratified to be made acquainted with.

"The rich marls of the Chesapeake, and its influent rivers, are now beginning to be introduced into the port of New Haven, as a manure to be transported by the Farmington canal into the interior. It remains to be seen whether the price and efficacy will sustain the undertaking. If this material should enable us to restore the culture of wheat, it would be a very important advantage."

There is no doubt but that the application of marl will restore, or produce, the wanting fitness of the soils of Connecticut for the growth of wheat; as their present general unfitness is owing solely to the deficiency of lime—an essential ingredient of, and therefore specific manure for, that grain. Nor do we entertain much doubt as to the economy and eventual profit of making this improvement, by applying the richest marls of Virginia, though sea-borne for so great a distance. It might be put on board sea vessels, under proper arrangement, at a total expense of 1½ to 2 cents the heaped bushel. It will be a strange, though by no means an impossible event, if the true and full value of the southern marl should be taught to the farmers of the south, by their enterprising brethren of the north transporting it hnndreds of miles by sea, to use for manure.

REPORT OF THE SOUTHERN CONVENTION.

[A convention of delegates of the merchants of the southern states, and of all others interested in the commercial prosperity of the south, some months ago was invited, and accordingly was held, at Augusta, Ga., on the 15th of October. The delegation was numerous, and able—and there is ground for hope that their movement will be zealously followed up, and sustained, by the entire south, until our agricultural and commercial interests are released from paying tribute to New York. Whether the particular measures, first proposed, will be of much or any effect, we know not; but the spirit which dictated them, if sufficiently diffused and active, must bring about liberation from our present state of commercial bondage. The southern states, and more especially Virginia, formerly possessed a fair proportion of ships, and of foreign trade: now, both have almost ceased to exist: and though southern agriculture still furnishes much the greater part of all the products exported from the United States, yet nearly the whole trade of the south, both of import and export, is carried on by northern merchants; and every bale of merchandize exchanged, by a southern planter or merchant, is made to pay a heavy transit toll, or tax, to New York.

If the great preponderance of bank capital, and government deposites, in the northern cities, have caused this deplorable state of southern trade, the present wretched state of the currency, and distressed condition of the people, may produce a more than compensating benefit, by destroying, forever, this artificial and, to us, ruinous course of trade. The bubble of paper money has been recently so distended as to burst; and much as the accompanying and consequent calamities are to be deplored, they at least offer benefit to the south, if properly availed of, in putting down the unnatural and factitious advantages given to the north, by the combined operations of banking and of government.

The following report was prepared by Gov. McDuffie, as chairman of the committee to which the subject was referred; and was adopted without opposition. The convention also passed a resolution recommending another meeting of delegates from all the southern and south-western states, in Augusta, on the first Monday in April, 1838, to continue the consideration of the objects of this convention, and the interests of the people represented. We hope that the call will be properly responded to, and that the south will not lose the present opportunity to recover and maintain her lost ground.

Numerous and respectable as was the attendance at this meeting, there were no delegates except from South Carolina and Georgia. The absence of all others was caused, not by a want of interest in the object, but by the doubt whether it would be possible to reconcile the conflicting claims of various towns—and the belief that it was better not to be represented in the convention, than to be represented and out-voted. It was therefore best, perhaps, that the first meeting was so constituted as to be unanimous, and not to be drawn off from the consideration of the great object, to the discussion of conflicting and petty sectional interests. It is hoped that the next convention will exhibit a full representation of the southern people and their interests—and that every member will be actuated by a patriotic determination to forego, if necessary, the effort to gain any separate and minor benefit, that may conflict with the great objects of general interest to the whole south. Such separate efforts would, indeed, be totally fruitless; for if the united influence of the whole, cannot give a new direction to their trade, for the general benefit of the south, it will be a vain and hopeless attempt for any fragment of the south to urge its peculiar and separate interests, in opposition to the majority. Our great commercial channels and marts had better be *any where* in the south, (on the Atlantic coast,) than where they have long been fixed.—Ed. Far. Reg.]

The select committee raised for the purpose of ascertaining and reporting, what measures will, in their opinion most effectually contribute to the accomplishment of the great object of this convention, ask leave to submit the following report.

The committee are deeply impressed with the

importance of the duty assigned them, and have bestowed upon it all the attention their limited time would permit.

They regard the present derangement of the currency and exchanges of the country, however we may depreciate its causes and deplore its immediate effects, as furnishing an occasion, which, if wisely improved, will relieve the staple growing states from a state of commercial dependence, scarcely less reproachful to their industry and enterprise, than it is incompatible with their substantial prosperity.

The staple-growing states, while they produce two-thirds of the domestic exports of the United States, import scarcely one-tenth of the foreign merchandise which is received in exchange for it. Almost the whole of the foreign commerce which is founded upon the productions of our industry, is carried on by the citizens of other states, causing their cities to flourish, while our's have been sinking into decay.

In the opinion of the committee, the period has arrived, when our citizens are invoked by the united voice of interest and patriotism, to put an end to this voluntary tribute, amounting annually to something like ten millions of dollars. It is believed that the quota of Georgia and South Carolina alone, amount to not less than three millions of dollars. It may not be disguised, however, that this extraordinary and unequal state of commercial relations, had its origin, more in the fiscal operations of the government, than in any supposed deficiency in the industry and enterprise of our citizens. The high duties imposed by the tariff of 1816 upon the productions of southern industry, and the still more enormous duties imposed by those of 1834 and 1828, combined with the unequal system of depositing and disbursing the revenue, thus collected, almost exclusively in the northern cities, operated as a bounty to the commerce of these cities, which the most persevering industry and enterprise on our part, could not have overcome. Great and obvious as were the natural advantages of our southern cities, they were more than counterbalanced by these operations of the government. And whilst we stood amidst the ruins thus produced by mis-government, many of our own citizens were utterly unable to account for the phenomenon; and some of our charitable neighbors supposed it to be owing to the curse of heaven upon our domestic institutions.

Every practical man, however, will at once perceive, that the deposite of almost the whole of the government funds, in the banks of the northern cities, was equivalent to a loan of a like sum without interest; and that the immense sums disbursed by the government at the same points, operated, even more decidedly, to give those cities an undue ascendency. One of the most obvious and salutary consequences which we may confidently anticipate from the reduction of the duties and the withdrawal of the government deposites from the banks, will be the restoration of the southern cities to a condition of comparative equality, in the business of foreign commerce. In a fair and equal competition, it cannot be doubted, that they will be able to exchange our domestic productions for the manufactures of Europe, by a direct trade, more advantageously, than the northern cities can do it by a circuitous process, involving immediate transfers and agencies, all increasing the risk and expense of the operation.

There never was presented to the capitalists of the south and south-west such an opening for profitable enterprise, and they are invited by the most powerful consideration to improve it. Now that the fiscal operations of the federal government have been so greatly reduced, and the field of competition fairly opened, if they should still look on with listless apathy, while the mighty current of our own peculiar commerce is flowing literally by them, to nourish distant cites and fertilize the barren hills of distant communities, we must then acquiesce in the judgment which the world will pronounce, that we deserve our destiny. But the committee indulge the confident belief that such a reproach will no longer rest upon us. The public spirit of our people has been roused into action—they have been awakened to a sense of their condition, and all are prepared to co-operate, in their respective spheres, in the great work of throwing off the shackles of our present colonial condition and establishing our commercial independence upon a lasting foundation.

The staple growing states never can be practically independent, and enjoy the full measure of the bounties which providence has so abundantly provided for them, until the commerce which is founded upon their valuable productions shall be carried on by our own merchants, permanently resident amongst us, whether they be native or adopted. The pursuits of commerce must be liberalized; the commercial class must be elevated in public opinion to the rank in society which properly belongs to it. The avocation of the merchant requires as much character and talent, and is of as much dignity and usefulness, as any other pursuit or profession; and the senseless prejudice which would assign to it an inferior rank, has been blindly borrowed from those ancient republics and modern despotisms, whose policy it was to regard war as the only honorable pursuit. As agricultural productions, which find their market principally in foreign countries, constitute the almost exclusive source of our wealth, the mercantile class is as indispensable to our prosperity, as the agricultural. Their interests are inseparably identified, and whatever affects the prosperity of the one, must have a corresponding influence on the other. How much, then, does the general welfare of the staple-growing states depend upon diverting into the pursuits of commerce, a large portion of the capital, the character and the talent, which have been hitherto directed, too exclusively, to agriculture and the learned professions? It is the deliberate opinion of the committee that no one change could be made in our pursuits, that would so largely contribute to the public prosperity; and that those public spirited citizens who shall take the lead in this new career of useful enterprise, will deserve to be regarded as public benefactors.

The prevailing habit of investing almost the whole proceeds of our cotton crops in land and negroes, has produced a constant tendency to over-production in this great staple; and nothing but the extraordinary increase of its consumption in the great markets of the world, has prevented us from experiencing the ruinous consequences of our mistaken policy. In this view of the subject every dollar that shall be diverted from the production of cotton, or some other profitable pursuit,

will be so much clear gain to the planter, and to the country.

It is a well established principle in political economy, that an excess of supply beyond the efficient demand, diminishes the price of an article more than in proportion to the excess, and that a deficiency of supply increases the price in a corresponding degree. For example, it is believed that if the present cotton crop of the United States should be only 1, 200,000 bales, it would produce a larger aggregate sum to the planter, than if it should prove to be 1,500,000 bales, the price being more enhanced, than the quantity would be diminished. It was upon this principle that the Dutch East India Company, actually burnt one half of their spices, that they might obtain more for the remaining half than they could have obtained for the whole. Let us pursue a still wiser policy. Instead of burning our surplus, let us direct the capital and industry that produce it to other profitable pursuits, which will open new sources of wealth, and at the same time increase the value of those already in existence. In connection with this view of the subject, the policy of raising every supply which the soil will produce, cannot be too strongly recommended. By whatever specious reasons a contrary policy may be countenanced, experience proves them to be fallacious. If every planter would raise his own supplies of various productions of the soil, and of the animals which feed upon those productions, it would tend greatly to limit the excess of production of our great staples, and increase at the same time the independence and the income of the agricultural class.

The committee will now proceed to examine, a little in detail, the relative advantages of the southern cities for the business of foreign importation, compared with those of the northern cities. In the first place, house rent is much higher in the latter than in the former, a very important element in the calculation. In the second place, freight is habitually higher from Europe to the northern, than to the southern cities, for the plain reason that ships coming to the south for cotton would have to come in ballast if they were not freighted with merchandise. All the other elements that constitute the cost of importation, are believed to be as cheap in the southern as the northern cities. It is thus demonstrable that foreign merchandise can be actually imported and sold in the former at cheaper rates than in the latter places. When to this we add the expenses of trans-shipment at New York or Philadelphia, the loss of interest, the freight and insurance to the southern cities, and the expenses of landing and storing there, it will be apparent that the merchants of the south and south-west will find it greatly to their advantage to make their purchases of foreign merchandise in our own cities, in preference to New York or Philadelphia. The same course of reasoning will show that our cotton can be exported directly from our own seaports, with similar advantages over the more circuitous route of the northern cities.

It seems, therefore, perfectly clear to the committee, that our capitalists who shall enter into the business of importing foreign merchandise, cannot fail to realize ample profits, and yet supply the merchants of the interior on terms more advantageous than they can obtain from the northern importers. They have every natural advantage in the competition, and are invited by every motive, public and private, to embark in the business, and reap the rich harvest that lies before them. It cannot be doubted that the merchants of the interior will give them a preference, since, to the motives of interest, those of patriotism will be superadded.

Among the measures which will most effectually promote the great object which has brought this convention together, none are more prominent, in the estimation of the committee, than the completion of the great works of internal improvement, by which the southern Atlantic cities are to be connected with the valley of the Mississippi. In aid of the individual capital and enterprise engaged in these works, it is believed that the patronage of the states interested, might be wisely and beneficially bestowed. Their completion would greatly promote the system of direct importations through our own sea ports; and these importations would equally promote the completion of the works in question. They are parts of one great system, and will mutually sustain each other. If Georgia and South Carolina, with that harmony and concert of action which the inseparable identity of their interest so strongly recommends, would bring their individual energies and resources to the completion of those lines of communication connecting their Atlantic cities with the navigable waters of the west, the day would not be distant when our most ardent hopes and sanguine anticipations would be realized.

The committee beg leave to suggest to the convention, another measure, which in their opinion would be eminently conducive to the great object we have in view. One of the obstacles in the way of establishing a system of direct importations, is the want of the requisite capital applicable to that object. The country, it is believed, contains a sufficiency of capital, if motives could be presented to give it a proper direction. To effect this, the committee can suggest no measure which in their opinion would be so effectual as a law limiting the responsibility of copartners to the sums which they shall put into the copartnership. A large portion of the capital to which we must now look for carrying on the business of direct importations, is in the hands of planters, and men of fortune who have retired from business, who would be willing to put a portion of their surplus capital into importing co-partnerships, under the management of men of character and capacity, but would never consent to make their whole fortune responsible for the success of the undertaking. If they actually contribute a certain amount of capital, and the public is apprised that their responsibility extends no further, it is obvious that the credit of the concern will rest upon the substanial foundation of the capital paid in. Nothing can be more fair, as it regards the public, and nothing would so effectually direct the capital and enterprise of our citizens into channels where it is so much wanted. The committee think it would be expedient to memorialize the legislatures of the southern and south-western states on this subject, and recommend to the convention the appointment of committees for that purpose.

Another measure which would greatly facilitate the establishment of a system of direct importations, would be the formation of a connection and correspondence between some of our banks and some of those in England, by which each should

have a standing credit with the other. This would enable the banks here to furnish the merchants, who might wish to puchase goods in England with letters of credit, upon receiving adequate security. The bearer of such a letter would have to pay interest only from the time he actually drew the money to pay for his purchases. This would prevent the loss of interest which he would incur, if compelled to provide himself with money before he sets out on his adventure. Cotton purchasers from England would derive the same benefit, by obtaining similar letters from the banks there, upon those of our banks with which they should have an established credit.

If, in addition to these facilities, our banks would establish agencies in Europe, and advance a limited amount upon cotton, consigned to them, it would greatly contribute to accomplish our common object, by enabling our citizens to export their own cotton, as well as to import their own merchandise, without the intervention of any northern agency.

In concluding their report, the committee cannot but express their strong conviction, that the success of this great movement towards the emancipation of the staple-growing states, from their commercial trammels, will depend more upon individual enterprise, sustained and supported by an enlightened public opinion, than upon any measure of legislation, howsoever important these may be. The business of direct importations must be commenced at once; for if the present occasion is permitted to pass away unimproved, one equally propitious may never occur. The committee recommend the convention to adopt the following resolutions, in furtherance of the views expressed in the foregoing report:

1. *Resolved*, That in the opinion of this convention, the present conjuncture in our commercial affairs is eminently propitious for the establishment of a system of direct importations, through our southern and south-western cities, and that we are called upon by every consideration of interest and of patriotism, to throw off the degrading shackles of our commercial dependence.

2. *Resolved*, That with a view to induce public spirited capitalists to embark in this business, the people of the staple-growing states be recommended to give public manifestations of their determination to encourage and sustain importations through their own seaports.

3. *Resolved*, That two committees be appointed by the president of this convention, to memorialize respectively, the legislatures of Georgia and South Carolinia, on the subject of limited partnerships.

4. *Resolved*, That a committee be appointed to prepare an address to the people of the southern and south-western states, setting forth the advantages and practicability of carrying on a direct trade with foreign nations—exhibiting in detail the extent of their resources.

5. *Resolved*, That said committee, in preparing such address, embody and conform to the views of the convention, as expressed in the preamble and resolutions adopted.

PLAN FOR PROCURING AND PUBLISHING A GENERAL REPORT OF THE PRACTICAL EFFECTS OF MARLING.

Copies of the following circular letter, and list of queries, have been sent to one or more farmers in each of all the counties in which marling has yet been commenced, in Virginia, Maryland, and North Carolina. It is desirable to have answers from every individual who is well qualified to furnish information, by his having had extensive practical experience, and facilities for making correct observations on this subject, (or from the most experienced in each county, where the practice has been very recently commenced)—and as our personal acquaintance with, or information by report of, such persons, must necessarily be very limited and imperfect, no doubt we have omitted many to whom we would otherwise have certainly directed copies of these queries. We therefore request that the letter and queries may be considered as a *circular*, addressed generally to all such farmers as are eminently qualified by experience to aid the general object, and not by any means intended to be confined to those only to whom separate copies may be specially directed.

If the answers returned to these queries, should be sufficiently numerous, and full and explicit, a digest of them, though limited to a single important branch of agricultural practice, will constitute, a full and clear *agricultural report*—such as ought to be made on every branch, and which, if properly done, by order of an enlightened and patriotic legislature of any one of the United States, would be eminently beneficial to the promotion and progress of agricultural improvement and profit throughout its territory. We grieve to say, that in Virginia, there is no present prospect of any such noble and beneficial work being undertaken and executed by the legislature. But if there is, indeed, the least ground for hope of such results, either in this, or other neighboring states, there will be nothing better calculated to nurse and cherish that hope until it grows into the fruition of all the benefits contemplated, than presenting to the public the special report now proposed, and for which the agricultural public will be indebted solely to private zeal and labor, and the gratuitous expenditures of private individuals.

It is desirable that the answers may be returned as early as February 1st, at latest. Any delayed until that time, may be sent to Richmond, through members of the legislature, and placed in the care of the clerk of the Committee of Agriculture.

(CIRCULAR.)

Petersburg, Va. Nov. 1837.

TO ———— ————ESQ.

It is desired, as an important means of promoting agricultural improvement, and of exhibiting the true value of the resources of the tide water region, to obtain full information of the facts ascertained, and opinions formed, by some of the most experienced and judicious users of marl, in every county where the practice has been introduced, in regard to the action and value of that manure.

In aid of this object, you are requested to send answers to the annexed queries, numbered in like manner, for ready reference, and as soon as your convenience may permit. Should answers be obtained in full, and from as may different sources as it is hoped, it is proposed to condense and digest the whole for publication, (but so as to preserve every important fact

and opinion of value, and stating the authority on which each rests,) so to present what may be considered the *statistics* of this new and important branch of agriculture, so far as its use has yet extended. If this movement is properly sustained by you, and others who are best qualified by experience to give correct information, it is believed that a body of evidence will be produced, that will most effectually urge on the progress of this great improvement, and serve well to raise to its proper estimation, the value of the lands of the country so greatly favored as to possess accessible beds of marl, or other calcareous manures.

Though much has been already done for improving the soil, by marling, in Maryland and Virginia, and something in North Carolina, and though wherever the effects are *seen*, the practice is rapidly extending, and its profits and advantages universally acknowledged—still, the cultivators of a much greater extent of land in these states, and having the facilities, have not yet commenced marling, simply because they have not yet personally witnessed its effects. Throughout the whole extent of South Carolina and of Georgia, (without including Florida, and other newly settled regions, in which the improvement of land is as yet totally disregarded)—marling is equally practicable, and as much wanting, as in lower Virginia, and as yet not even an experiment has been made of the practice.

Next to *seeing* the effects of marling, the most instructive lesson on its value, and the strongest inducement to its use, will be presented in such full testimony as these queries may elicit. But full as they have been made, for the purpose of saving trouble in writing answers, and for directing them to certain and like points, it is not to be expected that answers can be given strictly correct, or otherwise than on belief and supposition. But no one should be deterred on this account, from answering; as so many different expressions of opinion, of different individuals, even though each may vary somewhat from the others, and all somewhat from perfect accuracy, (if that were attainable,) yet will, by their comparison, serve to show a close approximation to correct views and well established facts, on every particular point.

Respectfully,

EDMUND RUFFIN.

Editor of the Farmers' Register.

QUERIES TO ASCERTAIN THE ACTION AND EFFECTS OF SHELL MARL AS MANURE.

1. When was the use of marl as manure commenced on your ———— farm, in ———— county?

2. Whose property was the farm, and under whose direction was its general management, (if not your own,) then, and since?

3. What do you suppose was the number of acres marled previous to January, 1820—after that time and before January, 1830—and from that time to January, 1838—and making altogether what total number of acres?

4. What was the usual strength of the marl used, or its proportion per cent. of carbonate of lime, or pure shelly matter?

5. Was there any peculiar quality or ingredient, besides the carbonate of lime, that served to give additional value to the manure—as "green sand," or gypsum, or a large proportion of fine clay, &c.

6. Or was there anything that served to lessen the value, as stony hardness of many shells, or of masses of marl, &c.?

7. What have been the usual quantities of marl applied to the acre?

8. Have there been made trials of any *much lighter dressings* of marl than the usual quantities—and if so, what were the results, compared to the usual quantities?

9. Have there been made trials of any *much heavier dressings* than the usual quantities—and with what comparative results?

10. Was the cropping and general management of the land, *for a few years immediately previous to its being marled*, such as might be considered *meliorating*, or *improving*, (or at least as *preserving* its degree of fertility,) or was it *impoverishing*, and wasting of fertility in general?

11. The same question as to the few years immediately after marling?

12. What have been the usual and general results of the applications of marl on the increase of the crop next following, on land in different conditions—and afterwards to the present time?

13. Have the fertilizing effects of marl (or its early increased production) been subsequently increased or decreased by lapse of time—and in either case, under what circumstances?

14. Is it your opinion, founded on experience or observation, that the early increased product of your marled land (say for the first three or four crops,) has been, or will be, subsequently diminished, under any rotation of crops, or course of cultivation, that would not have been decidedly exhausting, and injurious to the land, if marl had not been applied? *

15. Has sterility, or other damage, been caused on any part of the land, by applying marl too heavily, or in any other manner—and under what circumstances of soil, tillage, &c.?

16. Has it been found that any other manures, either vegetable and putrescent, or mineral, are more efficacious, or durable, on poor natural soils, *after* marling them—and if so, under what circumstances?

17. Taking such general grounds for the estimate as may be satisfactory to your own judgment, state what you suppose to be the present *general* or *average nett product* of the land marled, caused by, and owing to marling—per acre, and also in total amount from the whole farm? †

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* The object of this query is to obtain opinions as to the duration of the effects of marl; or whether the improvement made thereby is permanent, or temporary and transient.

† N. B.—To answer the last query, it is not necessary to estimate the whole cost of tillage, or management, thence to calculate the former and present nett product. It will be sufficiently accurate to estimate, by supposition, the *general increased labor of cultivation*, &c. after marling, and the *general increased production;* and the statement of the excess of the latter, over the former sum, will be the increase of nett profit, required by the query.

18. Does your experience or observation serve to confirm or contradict any of the important theoretical doctrines in regard to, or any statement of practical effects of marl presented in the 'Essay on Calcareous Manures'—and in either case, in what respect?

19. Which and whose was the the earliest experiment of marling, and also regular use of this manure, in———— county?

20 As nearly as you can learn by inquiry of, or concerning the various individuals, how many acres of land are supposed to have been already marled in ———— county?

21. State any other facts, within your knowledge, (not embraced under the foregoing queries) which may serve to throw important light on the first introduction and subsequent use of marl in your county, and on its value as manure?

ADDITIONAL QUERIES, ADDRESSED TO PERSONS WHO HAVE USED "GREEN SAND" EARTH, NOT CALCAREOUS, OR NOT EFFERVESCENT WITH ACIDS.

22. In what quantities, per acre, have you used the earth called "green sand" as manure?

23. On what extent of surface, and for what length of time?

24. On what kind of soil—and especially, as to whether naturally rich or poor, and whether marled or not—has this manure been operative, or of no effect?

25. What crops is it beneficial to, and on what has it little or no effect?

26. Is its beneficial effect durable or transient—and to what known extent?

EFFECTS OF MARL, AND OF GREEN SAND.

Walnut Hill, Charles City Co. Va.
October, 17th, 1827.

To the Editor of the Farmers' Register.

The promise I made you, to give the result of some experiments I had been making in the use of marl and green sand, would have been complied with long since, had I not been so much engaged during my recent visit to Virginia, in making preparation for my speedy return; and now, whilst on a visit to a friend and neighbor, who is absent on a visit to myself, and whose return I await, I have resolved to relieve myself, during the short interval, of my experience on this subject; and should my communication fail in interest to you, or your readers, let the occupation which I have chosen in another state, in exchange for the most independent, honorable, and virtuous calling in the world, be my apology.

The period at which I commenced transporting marl, from Coggin's Point, (as stated in the Farmers' Register, vol. i. p. 567) I think was in April, 1833. In the fall of that year, at the solicitation of one of my tenants, a lot of land containing about 5 acres, was covered with marl in the proportion of two hundred and fifty bushels per acre, sown in wheat, and in the spring following sown in clover. This land received a slight top-dressing of barn-yard manure, which I did not conceive worth the hauling that distance, and, as I had suspected, not the smallest appearance of benefit from it to the growing crop of wheat could be observed. t did answer, however, as a covering for the clover seed, and prevented them from being washed into the water furrows, by severe heavy rains, that fell soon after they were sown. The crop of clover was not an abundant one, by any means, and was permitted to fall on the land. In 1836, the same land was planted in corn; and the season was a very favorable one, as you know. In my opinion the crop was about 5 barrels to the acre; and I hazard nothing in saying that the same lot of land has never yielded me, since 1820, in any one year, more than five barrells of good corn [or one barrel to the acre]. By all my neighbors, the piece of land had been observed, and the last product, was by them estimated higher than I have done. There was land adjoining, on which I had used the same quantity of marl, which I had obtained from Surry county. This land had been marled immediately before it was put in corn; and although the improvement was very great, compared to the crop of the same land, when before in corn, yet I could not say that increase was more than enough to pay the expense incurred.

In an adjoining field, I had used fifty bushels of green sand, in addition to the 250 bushels of marl on a single acre; and on examination, made a few days since, I discovered not so much difference in the clover as I had hoped for; but still was enabled to trace the boundary of the acre, on which the green sand was scattered, by a slight differference in the appearance of the clover on the land adjoining.

The greater part of the marl which I obtained from Coggin's Point, was used in a field which is now in corn, the second crop since the application; and although the drought has injured, very materially, the whole corn crops of the neighborhood, the crop on this field is a very good one; and from my summer residence, on the hill overlooking the field, a distance of half a mile, the boundary line of marl is very plain to be seen, and the difference would at once be pronounced, on examination, to be at least 200 per cent. on the crop across the line, cultivated in the same manner.

I rejoice to learn that marl has been found very abundant on the middle ridge of our county, lying between the rivers James and Chickahomony, and that the inhabitants are freely using it; some are hauling a distance of one mile, and I hope, soon to know that the energies of our people, in Old Virginia, generally, are being roused on this subject, as I feel confident, that by its use, the very poorest land in the state may be made rich, by the combined use of marl, clover, and plaster, in small quantities.

I am still engaged in the transportation of marl from the county of Surry, almost seventeen miles by water; and shall continue it until the whole of my land, now open, shall be covered with at least 250 bushels per acre.

C. H. MINGE.

EXTRACTS OF PRIVATE CORRESPONDENCE.

Hampshire county, Virginia, Oct. 26, 1837.

SIR:

I herewith enclose you five dollars, the subscription price of your Farmers' Register for one year.

You will perhaps recognize in me an old subscriber, or at least a subscriber for one year heretofore. I was taking so many political papers and monthly publications, when I discontinued your valuable paper, that I could not find the means to spare to continue it; but now that I have got rid of my nonsensical trash, I resume my subscription to you for your Register, which I consider of more value to the farmer than all the Yankee publications put together in the United States.

You will discontinue at the expiration of my time, unless otherwise directed, as I never will take any publication unless I can pay in advance.

[We shall again obey our subscriber's direction, while we assure him that we desire from him no such security against his falling too much in arrear of payment.]

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Nottoway, November 12, 1837.

DEAR SIR:—You will perceive by the inclosure that I have read the last No. of the Register, and, to use a mercantile phrase, "*noted its contents.*" I wish you to send me "Johnstone's Treatise on Draining Land, &c." if it will not be published in the Register.

You will confer a favor by writing me who manufactures the best machines for cutting stalks, straw, &c. I see many advertisements, but they are *all best.*

I am desirous of purchasing an hundred or two sheep. If you could assist me in the purchase, I would esteem at a great favor. Perhaps an advertisement on the cover of the Register would be the means of providing them—especially a ram of the best breed. I find sheep the most profitable investment I have yet made—a large flock, purchased last fall, having already paid for themselves this year, and leaving a ballance. I noticed in the last No. of the Register a remark of Gen. Washington's, that his sheep, when he was *at home* in 1789 yielded 5¼ lbs. the fleece, and in 1794 they yielded 2½ lbs. only. So much for attention. Mine yielded last year 2½ average, and this year 6 lbs. So much for the difference in sheep.

[We are unable to inform our correspondent which is the best straw-cutting machine. We have nothing to do with the contents of the advertisements on the covers, and in no case do we assume any responsibility as to their statements. Johnstone's work on draining will be republished entire in the Farmer's Register, as well as in a separate form—and but for the delay of the engraver in furnishing the plates, the greater part of the treatise would have already been printed, and ready to be issued to our subscribers.

We concur entirely with our correspondent as to the probable profit of sheep farming, in his part of the country. We have several times before, in this journal, recommended that branch of business, especially, for the range of hilly middle country of Virginia, which is unfortunately deprived of the aid of calcareous manures. We have no doubt but that a New England farmer cou'd make more nett profit by keeping sheep on a single poor farm in Nottoway, than is made by tillage on all the poor farms in the country.]

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